Harnessing Opportunities for Productivity Enhancement - HOPE

Annual Progress Report

July 2009 – June 2010

NARRATIVE REPORT

Executive Summary

The HOPE project has made good progress during its first year of operation, since commencing in June 2009. Some 177 milestones and outputs of a total of 258 (almost 70%) have been fully achieved as of 30 June 2010 (refer to Appendix B for details). Of the 258 milestones and outputs for the project, 39 may be considered to be major milestones, of which 22 had been fully achieved as of 30 June 2010. The balance of milestones and outputs are currently in various stages of implementation and will be fully achieved by 31 December 2010. Further details may be found in Appendix B.

Major highlights include:

- Targeting- time series data on sorghum, and finger and pearl millet production have been collected in a number of countries in WCA (Burkina Faso, Mali, Niger, Nigeria); ESA (Ethiopia, Tanzania) and SA (India).
- Monitoring and evaluation- A monitoring framework has been developed and selected indicators identified across the three regions.
- Human resource development- at least 5 graduate students (PhD, MSc) have commenced or are about to commence their thesis work on different topics in several countries (Niger, India, Tanzania).
- Capacity building-15 NARS scientists trained in survey methods (WCA-4; ESA-11); NARS scientists trained in statistical methods for trial analysis across WCA and ESA; training in screening for pearl millet downy mildew across all three regions; 3 Indian scientists trained in use of molecular markers for crop improvement; more than 4,000 farmers in WCA (1,400) and ESA (2,650) trained in crop management; and, training workshops on cereal technology options held in WCA (30 participants from Burkina Faso, Mali and Niger) and ESA (41 participants from Tanzania, comprising 13 women and 28 men).
- Sorghum breeding- new sources of resistance or tolerance to key biotic constraints identified: midge resistant lines multiplied and shared across the regions for further trials; 493 farmer-preferred varieties selected for *Striga* in Ethiopia, Eritrea and southern Sudan; MAS for *Striga* being used by NARS in Eritrea, Kenya, Mali and southern Sudan; and, aphid and shoot fly sources screened and multiplied in India.
- Sorghum hybrid development- four hybrids have been registered in Mali and, together with an additional three hybrids, have been multiplied for commercial release; eight hybrids with significantly better yields than currently available check varieties (ranging from 4.4 – 5.9 t/ha) have been identified in India and seed is now being multiplied.
- Sorghum crop management- farmer trials and farmer field schools have been established in WCA (324 farmers); ESA (60 farmers); and SA (200 kg each of four advanced lines has been produced for farmer participatory trials).
- Pearl millet production- on-station trials to evaluate cultivar by soil fertility treatments prepared in WCA (Niger) and response trials for micronutrients planned for India.
- Finger millet production- millet core collection characterised and a sub-set of 144 lines planted in Kenya for field evaluation; genetic resource databases for Ethiopia, Kenya, Tanzania and Uganda acquired and accessions evaluated for different traits, including blast resistance.

- Finger millet trials- Participatory varietal selection trials established in Ethiopia, Kenya, Tanzania and Uganda and NARS scientists and extension staff and farmers trained in the testing and selection of improved varieties.
- Improving markets- Survey instruments for consumer surveys (sorghum, pearl millet) developed; sample locations chosen; and, consumer surveys commenced in Maharashtra.
- Improving markets- linkage with the West Africa Seed Alliance (USAID-funded) established; specifically in the first instance to provide joint training on small-scale business skills.
- Technology adoption- various outreach activities have been undertaken through print (training manuals) and radio media across WCA (Burkina Faso; Mali, Niger); ESA (4 languages); and, SA (India- information flyers).
- Technology adoption- 1,100 kg of certified pearl millet seed was produced in WCA and more than 14,000 small seed packs distributed; in ESA, 1,400 kg of certified sorghum seed was produced and about 14,000 small seed packs distributed; a further 25 t of two new varieties has gone into national performance trials in Tanzania; in India, a total of 40 t of improved sorghum seed has been distributed to 6,000 farmers with an expected planting area of 2,700 ha.

I OBJECTIVES:

(A) Activities Carried Out in the Reporting Period

1) **Activity 1.1 - Targeting innovations for up-scaling and for reaching resource poor farmers:** In WCA, data on sorghum and pearl millet grown at the level of "department" were collected by partners in Niger, Mali, Burkina Faso and Nigeria. In Niger, a time series (1995-2008) of production data on sorghum, pearl millet, maize, cowpea, groundnut, sorrel and vouandzou was gathered. In Mali, a time series of data from 1998/99 to 2007/08 was gathered on pearl millet, sorghum, maize, fonio and wheat. Data from Burkina Faso includes a series for cereals from 1999 to 2008. Data on major markets have been gathered in Niger and Mali and are being overlaid. Data on soils are drawn from FAO maps. In ESA, crop maps based on statistics for the target countries were developed. Additional data on agro-climatic conditions and socioeconomic characteristics is being collected to facilitate the collation with crop maps. Target areas within the crop growing regions in Ethiopia and Tanzania and hot-spot testing sites for the project were selected and defined with partners. In SA, state and district level data on area, production and productivity of post-rainy season sorghum and pearl millet were collected up to 2007-08 and time-series data is available from 1970-71 to 2007-2008. GIS maps of area and production of target crops were prepared, and are available.

2) **Activity 1.2 - Analysis of investment opportunities for research and development in crop improvement (CI), crop management (CM) and market access (MA):** In WCA, literature on investment options has been assembled in all countries except for Nigeria. In ESA, data on available technologies for sorghum and millet is being assembled in Ethiopia and Tanzania to facilitate the process of determining expected benefits from new technologies in consultation with breeders and agronomists. In SA, data and literature on available technologies for post-rainy season sorghum in the Marathwada region in Maharashtra has been assembled. Impacts of adoption of recommended packages of practices and yields were assessed and a draft report prepared.

3) **Activity 1.3 - Conduct of baseline surveys for characterization of farmers, their trait preferences, input output levels and profitability of dry land cereals vis-à-vis competing crops:** In WCA, baseline surveys have been conducted in northern Nigeria. A total of 1,134 households were interviewed. Analysis of data is ongoing. In Niger and Mali, villages have been selected. Village and household questionnaires were developed and shared with NARS economists. In ESA reconnaissance visits were completed to the project areas in Ethiopia and Tanzania. Survey instruments were designed and developed for collection of baseline information from beneficiaries of the target areas and shared with partners in Ethiopia and Tanzania. All key indicators for monitoring impacts of the project were identified and included in the survey. The survey instruments were pre-tested in Ethiopia and then revised. In SA, survey instruments were designed and developed for collection of baseline information from beneficiaries of the target areas and shared with partners. Sample design for a baseline survey was finalized in consultation with partners.

4) **Activity 1.4 - Monitoring and evaluation of adoption and impact:** WCA contributed to the ongoing preparation of the gender plan and strategy. Monitoring and evaluation frameworks have been developed. In ESA, project planning meetings for the region and countries were held and, for the latter, in Ethiopia and Tanzania which facilitated the completion of initial interactions with partners and stakeholders. A survey instrument for gathering farmer preference data from Participatory Variety Selection (PVS) was developed and provided to breeders. Training for staff using the survey instrument was conducted in Tanzania. Monitoring and evaluation frameworks have been developed. In SA, monitoring and evaluation frameworks have been developed. Information on a few key indicators was collected from sample beneficiaries. A gender framework is in preparation.

5) **Activity 1.5 - Human resource development and policy dialogue to enhance targeting, adoption and impact of sorghum and millet technologies:** In WCA, one student registered at the "Universite Abdou Moumouni de Niamey, Niger" has been identified and will start field work on sorghum and pearl millet marketing. In ESA, training materials on survey design and data collection were prepared, and training participants identified in Tanzania and Ethiopia. Six lead socio-economists from Ethiopia and five from Tanzania were trained in survey design and data collection methods. Two MSc students have been identified in Ethiopia and Tanzania and are developing thesis proposals on sorghum and/or millet adoption and impacts. In SA, training material has been re-designed to meet the objectives of the HOPE project. One Masters student has been identified to work on "Resource use efficiency of post-rainy sorghum" in the Marathwada region of Maharashtra State under Objective 1.

6) **Activity 2.1 – Identify new sources of resistance/tolerance to and options for control of key biotic constraints**: The project achieved planned progress in terms of germplasm assembly and seed multiplication for research on midge (WCA, ESA), aphid (SA) and shoot fly (SA) resistance. In Ethiopia, Eritrea and southern Sudan, a total of 493 farmer varieties have been collected in *Striga* endemic areas. In SA, the techniques to screen sorghum for resistance to sugarcane aphid have been standardized. Seed of midge-resistant cultivars was exchanged with ICRISAT (ESA, SA), and received from CIRAD, France.
7) **Activity 2.2 – Identify options for sorghum intensification in target ecologies:** In WCA, new photoperiod sensitive sorghum hybrids were tested in farmers' fields in Mali, under a wide range of growing conditions differing in productivity level, due to a variety

of reasons. Unfortunately, very little variability was observed for sowing dates, due to the late onset of rains, and thus late sowing of all trials. In SA, ten post-rainy adapted R lines with varying maturity dates were evaluated at two dates of sowing. In ESA, morpho-agronomic data were collected on monthly sowings of 10 sorghum varieties with varying photoperiod responses and adaptation. All planned activities for seed multiplication were achieved, and mostly surpassed the targets.

8) **Activity 2.3 – Identify new and characterize already available hybrid parents for the targeted agro ecologies:** In ESA, the seed of 127 existing seed parents for the dry lowland ecology has been increased, and sent to two dry lowland sites for evaluation. A PhD student has been identified to conduct a diversity study on hybrid parents. In SA, seed of advanced generation potential B-lines (maintainers) was provided to partners in Sholapur for testing, and for creating new test-crosses. The same lines were also evaluated on-station by ICRISAT-Patancheru. Thirty-eight new B-lines, adapted to the post-rainy season environment were evaluated in detail at the ICRISAT-Patancheru station for productivity, charcoal rot and aphid resistance. For all traits, entries superior to the best controls were identified. In addition, 323 advanced potential restorer lines were evaluated. Selections were made based on bold and lustrous grain and grain yield. The same lines were test-crossed. Thus we initiated a hybrid breeding program targeted solely at the post-rainy season sorghum production system.

9) **Activity 2.4 – Develop hybrids with improved yielding ability and adaptation trials for specific target regions:** In Mali (WCA), testing of advanced hybrids and hybrid seed production has made more than expected progress. A total of 15 tall and 15 short guinea-type hybrids were tested across 10 sites. In addition, sets of 10 hybrids were tested by a large number of farmers. Hybrid seed production was successful and every farmer produced certified seed. Seed was thus available for large scale testing and demonstration in the season that is just starting. In SA, a total of 484 new hybrids were created using known A-lines adapted to post-rainy season conditions, and known R-lines from national partners. Hybrid testing during the *rabi* season in southern India included a multi-location trial with 28 post-rainy season hybrids along with three checks conducted at Sholapur and at ICRISAT-Patancheru for grain yield and charcoal rot resistance. Eight hybrids with a grain yield ranging from 4.4 to 5.9 t ha^{-1} were significantly superior to the popular check. The seed of superior hybrids was multiplied. In ESA, a total of 390 test-crosses were made for the dry lowland and the sub-humid sorghum ecologies, far exceeding the planned numbers using a wide range of A-lines including sweet sorghum A/B lines. About 50% of the hybrids had 100% fertility restoration.

10) **Activity 2.5 – Develop open-pollinated varieties with improved yielding ability and resistance to the predominant biotic and abiotic stresses in target ecologies:** In WCA, recurrent selection and the breeding of new open pollinated varieties advanced as planned in Mali, with all the milestones being achieved. We have conducted a multi-location evaluation of 1,100 S1 progenies, on-station and on-farm, in several replications. We selected 150 short and tall lines, for both the northern and southern Sudanian zones. In Burkina Faso these activities are being implemented in the 2010 season. In SA, a total of 140 post-rainy season sorghum varieties were evaluated at the ICRISAT-Patancheru station and compared to two check varieties. In Mali and in ESA (Kenya, Sudan and Eritrea), the team has advanced the seed multiplication of backcross lines with a varying number of *Striga* resistance QTLs into local varieties from all countries. Backcross lines for the introgression of stay-green QTLs have been advanced, and tested for the presence and absence of specific QTLs. Seed has been multiplied for detailed multi-location

evaluations in Ethiopia, Sudan and Mali for studying the effects of the transferred QTLs. For the sub-humid zone of ESA, newly obtained midge resistant lines have been evaluated in the sub-humid zone for grain yield ability, as well as stem borer and foliar disease resistance. Sites at Torit in eastern equatorial and Juba in central equatorial, southern Sudan have been identified for experiments in 2010.

11) **Activity 2.6 – Develop crop management options for key production constraints in target sorghum production ecologies:** In WCA, new cluster-based farmer field schools (CBFFS) were initiated in 2 communities in the Mopti region of Mali during the 2009 cropping season, For integrated *Striga* management, farmers focused on pearl millet, rather than sorghum, as *Striga* is primarily a constraint for pearl millet production. Village level diagnostic interviews were performed in 6 new sites and over 20 villages in southern Mali in the main sorghum production ecologies. A database was created with the characterization data. Thirty farmer trainers and 8 field agents from above mentioned sites were trained and preparations completed for installation during the 2010 season. In Mali, specific discussions with women's groups have been held to identify crop management options for testing in their fields. Specific varieties for testing have been chosen for each target ecology, with women and men farmers separately, targeting the key production constraints identified by them. For the 2010 season, a total of 344 such mini-experiments combining 2-4 new varieties and hybrids with one combination of agronomy treatments have been distributed through the collaboration with various partners. In ESA, a desk study to define specific agronomy treatments for on-farm experimentation has been completed. A protocol for testing these treatments for the dry lowland production system in Ethiopia has been finalized, and farmers have been chosen at the Mieso and Kobo communes. In SA, trials on sowing dates of post-rainy season sorghum intercropped with safflower and deep sowing with deep placement of fertilizer were conducted on-station, in the target region by project partners.

12) **Activity 2.7 – Farmer participatory multi-environment testing of newly developed sorghum varieties and hybrids with crop management options in target ecologies:** In all three regions of the project, and in most target ecologies, collaboration with extension services, NGOs, farmer organizations and seed companies have been established for the large scale organization of farmer managed trials with the aim to identify new varieties for release and dissemination. Each region has adapted the trial protocols to the region's specific needs, and has in most cases added a crop management component, or options for farmers to choose from. Thus the trials have now been planned and distributed for all the regions. In WCA, 15 new hybrids were included in the multi-location yield evaluations for the Sudanian zone of Mali in 2009. These were evaluated in seven villages, with 4 replications per villages, and at 2 research station sites, including artificial *Striga* infestation. The highest yield entries were all hybrids. In the post-rainy season ecology of SA the first results are available, and have attracted the attention of the seed industry. 200 kg of seed of each of four new/advanced lines were produced for farmer participatory trials. At MAU and MPKV, new varieties were identified for farmer's participatory varietal trial for the 2010-11 season and 15 kg seed of each variety has been produced. In ESA existing Farmer Field Schools were identified for the work in Tanzania; 15 farmers in each of the 4 districts in Tanzania, have evaluated two varieties chosen from a set of 4 under improved agronomy treatments, i.e., no fertilizer and 17 kg N/ha. In Ethiopia and Eritrea, trials have been planned and distributed for the 2010 growing season.

13) **Activity 2.8 – Enhancing research and leadership skills of sorghum scientists:** In WCA and ESA, the ICRISAT biometrician conducted a training course on analysis of

multi-location variety trials, using the Genstat software focusing on multi-variate statistical tools, such as GGE and AMMI biplots, as well as graphical tools. From all African partner countries, sorghum scientists participated in the course. Several have started using these tools for trials they had conducted earlier. In all regions, specific training workshops and sessions to adapt and apply protocols for conducting farmer managed variety by agronomic treatment trials were held with all partners in each region. In WCA, this included also Objective 6 partners. Thus, the variety evaluations are oriented towards dissemination approaches used by some of the partners. Graduate students have been identified in ESA (2 PhD students). In WCA, 1 PhD student is finalizing his studies, while 2 MSc students have been recently accepted to conduct their thesis research on topics important under Objective 2. Recruiting of additional students is on-going. In WCA, students are preparing for their degree as "agricultural engineer (ingenieur agronome)" (1 in breeding, 1 in *Striga* management) and technicians (2 in sorghum breeding, one female), as well as young graduates who have finished their degree training, but expressed interest in specific aspects of technical training have been accepted into the program (3 in breeding, one female).

14. **Activity 3.1 - Identify new sources of resistance to key biotic constraints, validate these resistance sources, determine resistance inheritance and where necessary identify markers as a selection aid:** During the off-season 2009/10, 139 lines of the wild × cultivated pearl millet *Striga* resistance mapping population was advanced to F4 at ICRISAT-Niger. The full population (total 324 lines) was supposed to be advanced by Dr. Jeff Wilson in Georgia, USA, but seed is not yet available. A rainy season 2010 pot trial is being designed and part of the mapping population will also be tested under field conditions. A PhD student from Niger is involved in this work, to be supervised by C.T. Hash and B.I.G. Haussmann. In the 2009 rainy season, samples of downy mildew populations were collected from pearl millet hybrids growing in farmers' fields in the Indian states of Haryana, Rajasthan and Gujarat, and representative isolates were established under greenhouse conditions at ICRISAT-India during the first half of 2010. During the coming year, the virulence of these pathogen isolates with be compared with available differential isolates, and sources of resistance effective against newly arisen virulence combinations will be identified.

15. **Activity 3.2 - Identify integrated control options for pearl millet insect pests:** During the 2009 rainy season a trial was conducted to assess the impact of four different pearl millet crop residue management treatments on incidence of insect pests. A preliminary survey was conducted during millet harvest at the INRAN research stations of Konni and Kollo, in WCA, to identify a second site for millet residue management studies. Some 0.4 ha has been reserved for an entomology trial to be conducted in 2010.

16. **Activity 3.3 - Identify options for pearl millet intensification in target ecologies for effective implementation of IGNRM:** In WCA, seed was produced and a protocol developed to test 16 soil fertility management options (combinations of organic manure with inorganic fertilizers) with 10 different pearl millet cultivars on-station at ICRISAT-Sadore, INRAN-Kollo and INRAN-Maradi. These trials will be complemented by on-farm demonstrations (covering only part of the treatment combinations) at several project sites in Niger. In SA, a recently concluded multi-year study of response to $ZnSO_4$ micronutrient fertilization have been summarized and best-bet treatments selected (along with three locally-adapted hybrids for each targeted state) for on-station micronutrient response trials to be conducted during rainy season 2010.

17. **Activity 3.4 - Strengthen national program capabilities for screening for resistance to key biotic constraints:** The ICRISAT-Niger research assistant, H. Dodo, received 4 weeks training at ICRISAT-India in the use of potted seedling screens for downy mildew resistance assessment in February 2010. Establishment of improved downy mildew screening facilities at ICRISAT-Niger was initiated, using available greenhouses. The pearl millet breeder from IER-Mali, M.D. Sanogo, present at ICRISAT-India as part of another research collaboration, also joined in this training program, along with four participants from the Indian national program: one representative from each of the states of Gujarat, Haryana, and Rajasthan, and one from the national program coordinating unit. Air conditioners were purchased for incubation rooms being established with pearl millet breeding programs in each participating Indian state.

18. **Activity 3.5 - Identify and/or develop pearl millet breeding lines and hybrid parents for target ecologies:** At ICRISAT-India, seed of 225 and 216 pearl millet breeding lines was produced, and distributed to HOPE project partners for multi-location evaluation in the target environments of Gujarat, Haryana and Rajasthan in the 2009 (Y1) and 2010 (Y2) rainy seasons. Based on the 2009 rainy season evaluations, 32 of 144 early-flowering B-lines were selected, along with 18 progenies from the ICRISAT-CAZRI B-Composite, for conversion to cytoplasmic-male sterile A-lines, and crosses to initiate conversion of the latter 18 inbreds were made during the 2010 dry season. In addition, 9 of 60 early R-lines, 3 of 40 high-tillering R-lines, and 4 of 41 stay-green R-lines were selected for advance. These were included among the total of 29 R-lines involved R×R crosses during the 2010 dry season to generate new breeding material. Similarly, seed of 74 and 75 potential hybrid parents was produced at ICRISAT-India and distributed to project partners for evaluation during the rainy seasons of 2009 and 2010, respectively. During the 2009 rainy season, 74 potential B- and R-lines were visually evaluated for flowering time and agronomic score on-station at 4 sites distributed across the target region. Parental lines involved in development of testcross hybrids (240 R-lines and 15 B-lines) were screened under greenhouse conditions at ICRISAT-India against downy mildew (DM) isolates (one each from Jodhpur, Jamnagar and Bhiwani) representative of the most virulent identified to date from project target states of Gujarat, Haryana and Rajasthan. Integrated marker-assisted and conventional backcrossing to improve DM resistance of elite pollinator lines J 2340 (male parent of early-maturing released hybrid GHB 538) and ICMR 01004 (male parent of early-maturing released hybrid HHB 67 Improved) using a total of 6 previously mapped DM resistance sources was advanced two generations during Y1. Selected J 2340-derived BC3F3 progenies (30) and their recurrent parent were selfed and testcrossed to male-sterile line ICMA 95444 during the 2010 dry season to produce replicated nursery sets of both J 2340-like inbreds and GHB 538-like hybrids, which were distributed for evaluation in Rajasthan and Gujarat during the 2010 rainy season. Pyramiding of resistances in J 2340 background will be initiated in Y2 while confirmation of resistance and agronomic performance are on-going.

19. **Activity 3.6 - Develop pearl millet hybrids with improved yielding ability and the necessary adaptation and market-required traits for specific target regions:** At ICRISAT-India, seed was produced and distributed for 188 testcross hybrids for evaluation in the 2009 rainy season, and seed of >300 new testcross hybrids was produced with 236 distributed for evaluation in the 2010 rainy season. During the 2009 rainy season, a total of 188 new testcross hybrids were evaluated, along with standard checks, in three different testcross trials conducted at target locations (10 trial × site combinations) in northwestern India. Forty-seven hybrids were identified for further evaluation based on their superior agronomic scores and flowering times compared to

standard checks. During the 2009-10 dry season, seed production of 40 of these 47 selected testcross hybrids was successful, so a trial of these 40 hybrids, and standard checks, was sent for evaluation at 3 locations (Hisar, Durgapura and Jamnagar) during the 2010 rainy season.

20. **Activity 3.7 - Create diversified populations, perform recurrent population improvement for priority traits, and generate new pearl millet OPVs adapted to specific target environments:** Targeting development of new diversified breeding populations, ICRISAT-Niger created full-sib (FS) families in eight types of material. These populations were then shared with HOPE project partners for 2010 rainy season evaluation. Building on results from previous projects, FS families were produced at ICRISAT-Niger and distributed for a final cycle of FS selection towards creating new experimental open-pollinated varieties based on seven populations. Activity 3.7 is expected to lead to the development of eight new breeding populations and nine new open-pollinated cultivars for the WCA region within the frame of the first phase of the HOPE project.

21. **Activity 3.8 - Evaluate the potential of newly developed pearl millet varieties and hybrids, and crop management practices, using large-scale, gender-specific, farmer-participatory multi-location testing approach:** In WCA, the IGNRM trials foreseen under this activity have been combined with agronomy trials from activity 3.3 in Niger (both on-station and on-farm trials involving 10 cultivars and 16 fertilization treatments). In the Mopti region of Mali, over 30 trials with 5 pearl millet varieties and two management options have been prepared for installation during the rainy season 2010. A training course for conducting FFSs was given in Niger in April 2010 (25 participants). Diagnostic interviews were then performed and FFSs are being installed at 7 sites in Niger (16 villages, about 400 participants). Topics treated in these FFSs are integrated *Striga*, soil fertility and head miner management, as well as variety demonstrations plots. Two field agents were trained in the implementation and facilitation of cluster-based farmer field schools (CBFFS) in May 2010 for 3 days. A one-day training course on CBFFS methodology was given in Mali in May 2010 (60 participants). Diagnostic interviews were performed for 2 new sites (13 villages) and FFSs are being installed in 13 villages and are being continued from last year in 2 sites (8 villages, about 575 participants). Topics treated in these FFS are integrated *Striga* and soil fertility management (micro-dosing, composting etc.), as well as variety demonstrations plots. In SA, 16 pipeline hybrids were identified by project partners (SK Rajasthan Agricultural University, Durgapura, Rajasthan; CCS Haryana Agricultural University, Hisar, Haryana; and Junagadh Agricultural University, Jamnagar, Gujarat) and their seed produced for participatory trials. Five researcher-managed participatory on-farm trials comprised of 19 pipeline hybrids (16 from project partners and 3 from private seed companies) were distributed in each village cluster and included in Objective 6 farmer-participatory technology demonstration/evaluation activities (5 trials × 2 clusters/state × 3 states = 30 trials) along with respective standard checks (HHB 67 Improved, HHB 197, HHB 117, RHB 121, GHB 538, GHB 744) for evaluation in rainy season 2010. The three private sector pipeline hybrids (1 from Bayer BioScience Pvt. Ltd, India and 2 from Bioseed Research India Private Ltd.) were included in order to better to assess their performance in drought-prone environments.
22. **Activity 3.9 - Strengthen research-for-development capacity:** Training courses were conducted in WCA on the following topics during Y1:
    - Participatory research and PVE
    - Statistical analysis of genotype × environment interaction

- Field agents (15) and lead farmers (70) trained in CBFFS system implementation and integrated *Striga*, soil fertility and millet head miner management in Niger and Mali.

Similarly, Y1 training courses were conducted at ICRISAT-India on the following topics:

- Three Indian pearl millet national program scientists participated in a 3-week training course (Nov-Dec 2009) on application of molecular marker-based tools for crop improvement, with two these (one man and one woman) supported by the HOPE project.
- One ICRISAT-Niger research assistant received 4 weeks training (Feb 2010) in screening of potted pearl millet seedlings against downy mildew, and was joined for two weeks by 4 national program scientists from India (all supported by the HOPE project) and the IER-Mali pearl millet breeder whose visit to ICRISAT-India coincided with this course.

Further, a junior breeder (Kassari Ango Issoufou) is involved in HOPE project activities at INRAN-Maradi in Niger.

23) **Activity 4.1 - Assemble finger millet genetic resources and use it to identify new sources of resistance to key biotic stresses:** The millet core collection was characterized and a subset of 144 lines that expressed variability in morphological traits and blast reaction was composed and planted at Alupe, Kenya. Agronomic traits, days to flowering, days to heading, plant height, number of tillers, panicle size and shape and reaction to different biotic stresses data were taken. The trials have been harvested and are being processed for post harvest data. ICRISAT in collaboration with Tanzanian and Ugandan NARs conducted collection missions in June-July 2010 to fill gaps. In Tanzania collection targeted the southern part of the country: Sumbawanga, Nkasi and Mbozi districts); a major millet growing area, but where little is known of its production. Ugandan collection targeted all major growing areas (Soroti, Kumi, Serere, Apac, Lira, Hoima and Masindi districts). A total of 37 and 92 samples were collected from Tanzania and Uganda, respectively; they are yet to be tested for duplicates.

24) **Activity 4.2: Identify sources of resistance to the key abiotic stresses, adaptation and quality traits:** No work was done in Activity 4.2 in year 1. Milestones are due from Year 2.

25) **Activity 4.3 - Develop breeding and mapping populations for improving finger millet resistance to blast, drought and adaptation to different agro-ecologies:** Varieties with contrasting morpho-agronomic traits (plant height, head compactness, seed color, plant color, days to maturity) were identified and 11 cross combinations were made using two emasculation techniques. The objective being to identify an efficient finger millet emasculation procedure. F_1 populations have been planted at Kiboko, Kenya and F_1s will be determined using morpho-agronomic marker traits and efficiency and ease in F_1 production determined. Contrasting varieties for blast resistance were crossed to initiate blast mapping populations at Kiboko. Twelve combinations and 69,258 seeds were produced. The parents are being genotyped to establish those contrasting genotypically, for their F_1s to be used in marker assisted selection (MAS).

26) **Activity 4.4. Identify and develop varieties with improved yielding ability, resistant to key biotic and abiotic stresses for the targeted agro ecologies and end uses:** Participatory Varietal Selection (PVS) trials were established in different countries using released or about to be released varieties. The trials are in different

stages depending on when the season set. In Tanzania the trials were established in February and March, with a total of 57 farmers. Most trials did not do well because seed was sent late; however improved varieties did relatively better than the locals. The trials in Uganda and Kenya are doing well; a total of 24 and 11 farmers respectively established PVS trials. PVS in Ethiopia have just been established and an update is yet to be provided. Farmer field days were then held in Tanzania and Kenya to help farmers appreciate the new varieties. Farmers were grouped based on their district of origin and requested to select varieties, and give reasons for their selections. Earliness, grain color, grain size and taste featured in all groups. More than 100 farmers participated per country. The field days are to be done in Uganda this month and later in Ethiopia. A workshop on PVS and participatory technology delivery mechanism was held in Tanzania in May 2010 as a training of trainees' course. Training focused on the use of participatory methods to identify key crop traits in the selection of varieties, collect data and use of PVS protocols, identify and initiate information and seed dissemination mechanisms for selected varieties and identify and prioritize production. Participants were requested to describe desirable traits and to give the most favorable varieties in their districts. At the end of the course participants were taken to a PVS plot for participatory selection. Key traits participants considered when selecting were earliness, drought tolerance, panicle (head) size, seed size, seed color, taste and market value. The training is to be extended to Kenya, Uganda and Ethiopia.

27) **Activity 4.5. Determine adaptability and yield stability of improved varieties for the targeted agro-ecologies and end use:** Testing sites in Ethiopia, Uganda, Kenya and Tanzania, have been identified and their biophysical characteristics are being gathered for collation. However, a number of sites are missing information and some of it needs to be collected; this is ongoing. NARS breeders have been requested to supply their best performing varieties for regional evaluation in MET trials. Kenya has already sent its materials and arrangements for shipment have been finalized for Uganda and Ethiopia and import permits have been dispatched.

28) **Activity 4.6. Develop and assess crop management options for key constraints in the targeted finger millet production ecologies to enhance productivity:** Information on the type of weeds in the region, the type of control practices (weeding, herbicide use, cultural practices) has been gathered. Fertilizer application combined with use of trap crops and herbicide application has been identified as the most practical weed control strategy. Trials have been established in Ethiopia and are to be established in Uganda, Tanzania and Kenya the following season. Drafts of experimental protocols to be used to assess the main and interactive effects of tolerant/resistant varieties on the incidence and severity of *Striga* damage have been developed and are being circulated among partners.

29) **Activity 4.7. Participatory validation of integrated improved varieties with crop and fertility management options to enhance productivity:** A protocol for evaluation of the four varieties across the countries is being developed. The trials are to be conducted the following season.

30) **Activity 4.8. Capacity building, knowledge and information sharing for pursuance of finger millet crop improvement and management:** Fifteen scientists from ICRISAT and NARS (Uganda, Kenya, Tanzania and Ethiopia), implementing

HOPE project had one week training in Multi-locational Experimental Trial (MET) data analysis.

31) **Activity 5.1 - Map marketing channels and measure transaction costs for selected value chains (food, feed, fodder) including competing crops (maize)**: In WCA, markets to be surveyed were identified in collaboration with the "Observatoire des Marches Agricoles" (OMA) du Mali, the "Système d'Information sur les Marchés Agricoles" (SIMA) of Niger and NARS economists. Contacts were initiated with NAERLS in Nigeria and market information systems in Burkina Faso for the same purpose. Participatory market chain analysis methodology has been developed and is being discussed with NARS economists and relevant stakeholders. Value chain actors, stakeholders in the institutions and policy environment and providers of business services are being identified in Niger and Mali in order to map the markets. Following market mapping, channels will be identified and transaction costs analysis performed. In ESA, objectives and methodology were drafted and discussed with partners in Tanzania and Ethiopia and the East African Grain Council (EAGC). In SA, survey instruments were developed to elicit information from traders, commission agents, processors and retailers of post-rainy season sorghum and pearl millet and distributed to partners to conduct market surveys. Household surveys (farmers growing post-rainy season sorghum in 2009-2010) were conducted to obtain data on marketing costs and the marketed surplus. Reconnaissance surveys were carried out to identify grain and fodder markets and information on prevailing marketing costs like commission charges, market fees, transport and labor charges etc. Time series data (1989-90 to 2008-09) on supply and prices of post-rainy season sorghum in major market of Maharashtra were collected and analyzed.

32) **Activity 5.2 - Establish existing seasonal demand, quality characteristics, prices and relative competitiveness of sorghum and millets in alternative uses (food, feed, fodder):** In WCA, a review of literature was carried out on sorghum and pearl millet utilization in the poultry sector and processing industries in Niger and Mali. Standardized survey instruments have been developed, although this has not yet been shared with partners. Meetings were held with the Food Technology Laboratory (LTA) of the IER in Mali and the Food Technology Laboratory of Niger (LTA) to develop a roster of sorghum and/or millet small-scale processors. In addition, using key informants, a list of poultry farms has been developed especially in peri-urban Niamey and Bamako. A sub-set of these stakeholders will be interviewed. Then the potential demand for sorghum and/or pearl millet for food and feed in those countries will be assessed. In ESA, this activity has not yet started. In SA, sorghum and pearl millet consumption demand, seed demand, export demand and demand for alternative uses was estimated at all India level using data from National Survey Sample Organization (NSSO), Government of India.

33) **Activity 5.3 - Identify consumer preferences, perceptions and price - and non-price factors that determine the demand for sorghum and millet in human diets:** In WCA, consultations with the National Directorate of Statistics of Mali and Niger have been established. Discussions were held on the sampling scheme used by these institutions to conduct the consumption-expenditure surveys and the possibility to use their data because they were collected quite recently and are large representative samples. In Niger, data were collected in 2007 and in Mali in 2005. The sample scheme is based on income groups even in the urban areas and rural versus urban groups. Standard questionnaires have been developed and shared with experts in those

institutions. In ESA, this activity will follow the expanded VCA completed by partners, (Activity 5.1). In SA, Survey instruments were developed and made available for conducting consumer surveys. Sample design and sample locations were finalized for consumer surveys in consultation with partners. The consumer surveys and additional reconnaissance surveys (meeting traders, processors and hotels for consumption demand) in target areas are in progress to estimate potential demand.

34) **Activity 5.4 - Evaluate and identify effective grain and fodder marketing strategies for reducing transaction costs and develop strategies for introducing grades and standards:** In WCA, five Producer Marketing Groups (PMG) have been identified by AOPP in Mali and five other PMGs have been chosen by Mooriben in Niger. Linkage with WASA is being established to train the management committees of the associations in small-scale business skills. In ESA, according to the proposal, this activity is scheduled for September 2010. In SA, market surveys have been initiated to evaluate marketing and transaction costs.

35) **Activity 5.5 - Develop appropriate models for farmer-market linkages using alternative formal and informal arrangements with buyers to improve market access:** In WCA, in the project sites in Mali and Niger, rural radio stations have been identified. Meetings have been held with the Head of Market Information Systems in the 2 countries for the best way to supply information to rural radios. One of the outcomes of the meetings was that market information is already supplied to farmers on a weekly basis. Discussions are initiated with the heads of MIS to look for possibility to increase the frequency of information supplied. In ESA, according to the proposal, activity will start in January 2011. In SA, farmers associations are being established under Objective 6 and models of bringing bulk buyers and farmer association under one platform are being explored based on information available from expert's opinion and literature. Existing channels of market information dissemination on post-rainy season sorghum are documented.

36) **Activity 5.6 - Determine opportunities for small-to-medium scale agro-enterprise development, local processing and value addition to stimulate markets and expand consumption demand:** Activity 5.6 commences in Y2 in WCA and ESA. In SA, some low-cost equipment for grain cleaning and sorting and low-cost fodder chopping equipment was identified for post-rainy season sorghum processing.

37) **Activity 5.7 - Strengthen local capacity for value chain and policy analysis and market projection:** In WCA, training modules have been drafted and will be finalized in September 2010 and training will take place in November 2010. One student from the Universite Abdou Moumouni of Niamey has been identified in Niger to do his thesis on "Competitiveness between sorghum and pearl millet relative to other cereals in Niamey, Niger". The student in Mali is yet to be identified. In ESA, two qualified graduate students have been identified for an MSc program in Tanzania, starting in the new semester (September 2010). In Ethiopia, the selection process is ongoing and one graduate student will be selected for the start of the new semester (September 2010). In SA, One MSc student has been identified to work on fodder marketing of post-rainy season sorghum in Maharashtra and one PhD student on consumption and marketing of pearl millet in Rajasthan.

38) **Activity 6.1 - Increase farmers' access and use of know how about the use and benefits of profitable crop management technologies and improved cultivars:** In WCA, the first draft of a training manual on integrated *Striga* management for pearl millet based systems in the Sahelian zone of Mali and Niger was completed, reviewed and awaits publication. Fourteen rural radio stations in 7 regions (4 regions of Mali namely Koutiala, Tominian, Dioila and Mandé; Sanmatenga province in Burkina Faso and Boucle du Mouhoun (Toma et Gassan, and Center-Nord in Niger) have been broadcasting 73 programs (days) on *Striga*, seed and variety issues in 5 different languages. In ESA, English versions of training manuals on integrated *Striga* management and micro-dosing for sorghum; integrated blast and weed management and micro-dosing for finger millet have been drafted, reviewed and are awaiting translation into 4 main languages (Oromiya, Amharic, Tigrinya and Swahili) by September 2010. Extracts from the training manuals in WCA and ESA have been used in training programs about managing *Striga* and other biotic stresses and the gained knowledge created demand for seed of improved pearl millet varieties in WCA. In SA, for sorghum, identification of primary and secondary diffusion villages in each of the three clusters in two targeted regions (Marathwada and Western Maharashtra) was completed. Outreach strategies were developed to encourage participation in project activities and also to inform farmers of the importance of post-rainy season sorghum, awareness about improved varieties, profitable crop management technologies and market opportunities as well as methods to increase productivity and profitability. Flyers on sorghum crop management and cultivation technology have been developed for each released variety. For pearl millet, 6 clusters were surveyed in Rajasthan state and Gujarat and 7 clusters for Haryana state and for each state two village clusters were identified for project activities. A total of 71 villages were identified as secondary diffusion areas for the three states and in collaboration with state Agricultural Universities, meetings have been conducted and flyers developed in local languages.

39) **Activity 6.2 - Increase availability and use of quality seeds of improved varieties:** In WCA, 1.1 tons of 15 pearl millet experimental varieties were produced and more than 12,000 mini-packs (100-200g each) were distributed through farmer/partners' organization in Niger, while 403 mini packs of 3 varieties were distributed in Mali, 95 mini packs of one variety in Nigeria, and 1750 mini-packs of 2 varieties in Burkina Faso. For sorghum, 1.4 tons of certified seed of 28 varieties was produced, and 4,000 mini-packs were distributed. In Mali, certified seed of 15 varieties and hybrids was provided and 2,181 mini-packs were distributed. In Nigeria, 3,980 mini-packs and 44 large packs (weighing 500g each) were distributed, while in Burkina Faso 3,830 sorghum mini-packs were distributed. About 30 tons of pearl millet seed was marketed by a farmer organization in Niger, and 2.5 tons of 7 sorghum varieties were commercialized. An existing training manual on seed production for pearl millet OPV's in the Sahelian zone and one for sorghum for Mali were adapted and reviewed by seed experts. A total of 62 persons (42 farmers including 10 women and 20 extension officers) from 4 different farmer organizations have been trained using the prepared manual. In Burkina Faso, 72 pilot farmers of three farmer unions were trained as trainers by INERA and a farmer organization in cultural aspects of sorghum and millet cultivation and experimentation. To ensure availability of seed for the 2010 planting season, more than 100 kg of sorghum breeder seed of 50 experimental and improved sorghum varieties is available at ICRISAT and IER and about 1 ton of breeder seed of 14 pearl millet varieties is available at ICRISAT Niger and INRAN. About 1.4 tons of foundation seed for 15 sorghum varieties and more than 1.6 tons of

11 pearl millet seed has been produced during the 2009 and 2010 season and off-season by ICRISAT and NARS.

In ESA, the certification standards have been compiled together with regionally agreed standards for Eritrea, Ethiopia, Tanzania and Kenya. The harmonized seed policies for SADC were endorsed and the process of domestication of harmonized policies has been initiated in 4 countries. More than 25 kg of breeder seed of each of the 12 improved finger millet varieties (P224, Tadessa, Boneya, Okhale1, GuluE, Padet, U15, Seremi 1,2,3 and Pese1) has been multiplied and is available for further multiplication. The total seed production for the 6 improved finger millet varieties is 2,230 kg. More than 2,000 kg of U15, KNE1034 and P225 will be harvested by the end of July 2010 and packaged into 500g packs for the 2010 October/November season. In Ethiopia, 0.5 ha each of Padet, Tadessa and Boneya has been planted as a source for foundation seed. A total of 23,000 kg of Macia seed produced by Namburi Agricultural Co Ltd in Tanzania and 2,000 kg of KARI Mtama 1 - a multipurpose variety is already in the National Performance Trial (NPT).

In SA, the MPKV identified 7 open pollinated varieties of sorghum which are suitable for the target areas i.e. Phule Vasudha, Phule Chitra, Phule Anuradha, RSV 1006 (Phule Revati) and the MAU identified varieties are Parbhani Moti, Parbhani Jyoti, Phule Vasudha, Phule Chitra and Akola Kranti. More than 200 kg of breeder/foundation seed of the identified OPVs were produced to meet the requirements for the coming season. A site has been identified at Mehboob baugh farm, in MAU Parbhani for construction of a seed warehouse. Developing training material (one flyer each) in the Marathi language on purity maintenance in post-rainy season sorghum seed production, seed storage and seed has been completed in MAU and is in progress in MPKV. Large scale commercial seed multiplication of the sorghum crop was done at Central Campus of MPKV, Rahuri (BSP Farm) and at the central farm (MAU), Research stations (Badnapur, Parbhani), KVK (Ambejogai/Jalna). Previously multiplied sorghum seed at Central Farm of MPKV, Rahuri was distributed to cover 1,500 ha (3,000 farmers) area in the selected cluster villages and at MAU procured seed was distributed to >3,000 farmers each with 0.4 ha area. A total of 40 tons of seed was multiplied and distributed in the project villages. Seed of parental lines of 7 pearl millet hybrids identified for adoption trials in 2010 was produced and supplied to APSSDC (Andhra Pradesh State Seed Development Corporation) for hybrid seed production. Based on the performance of promoted hybrids in different states, respective State Seed Corporations and private–sector seed companies will be approached to produce and market seed of identified farmer preferred hybrids. Seed of promoted hybrids was purchased from APSSDC and delivered to target clusters in Rajasthan, Gujarat and Haryana. Fertilizer (DAP) was procured and test–kits (seed for 0.4 ha plot + 25 kg DAP) were developed with the help of farmer organizations and distributed. In 2010, about 4,000 households were covered across the three states. The test-kits were distributed free to farmers, thus no revolving fund could be generated in 2010.

40) **Activity 6.3 - Increase availability and use of fertilizer and other crop management technologies:** In WCA, one key participant of the micro-dosing project in Mali was trained in on-farm experimentation and seed diffusion. A series of 12 demonstrations with 8 varieties and 3 crop improvement options were sown in June in Niger and partners will participate in evaluation visits. In addition, 22 farmer facilitators from 3 states identified in Nigeria and 12 TOTs and 52 FFS are being

established. In ESA, two farmer organizations, with a total of 801 women and 1,849 men, have been identified in Kondoa and Dodoma districts of Tanzania. These farmers will be linked to identified agro-dealers who will be marketing subsidized fertilizer. In Kenya, farmer organizations based in the western province districts of Siaya, Teso and Busia and working on finger millet were identified and are already linked through the McKnight Foundation. In SA, for sorghum, the MPKV identified soil testing facilities and 100 soil samples from each region encompassing all clusters were collected and analysis reports disseminated for the first year to all farmers related to this project. Linking farmer associations with input suppliers (fertilizer and pesticides) is on-going under MPKV, in the Rahuri region. The best management practices (fertilizer, spacing, insects and drought management) for the target regions for increasing the grain and fodder yield of sorghum were identified. On-station evaluations and Front Line Demonstrations (FLD) were conducted at MPKV (38) and MAU (35). For pearl millet, soil testing facilities were identified in all three states, but soil sampling and other related activities couldn't be accomplished due to a delay in signing of the MOU with the partner institutes. Crop management practices were identified and 30 demonstration trials have been planned for each state.

41) **Activity 6.4 - Improve access to output markets to increase technology adoption and cash incomes for farmers:** In WCA, several meetings with P4P were conducted which resulted in a contract between P4P and the ULPC farmers' organization which sold 150 tons of sorghum and millet grain to P4P in 2010. The P4P program also indicated interest in working in Fana/Beleko, where seed was produced with ICRISAT/IER and the ULPC in 2009. Milestones were achieved for one FO and partially for the second. In ESA, a meeting with Unga Mills in Kenya indicated that the company is able to purchase 600 Mt of finger millet monthly. Unga also provided specifications of the grain quality characteristics preferred by consumers. One finger millet buyer has been identified in Singida districts and there are on-going efforts to identify buyers to be linked with farmer organizations. A supplier of post- harvest equipment was identified and three sets of equipment (each for Ethiopia, Uganda and Tanzania) consisting of a thresher and a dehuller have been purchased and plans for testing and delivery to the target areas are under way. In SA, identification of retail market chains and grain wholesalers in the target areas is in progress. Weekly market, village level shop keeper, APMC's, Co-operative societies and wholesalers have been identified.

42) **Activity 6.5 - Improve farmers' access to finance to increase adoption of purchased inputs, production of seed, and surplus grain for marketing:** There were no activities planned for Activity 6.5 for Year 1 in both WCA and ESA. In SA, 5 banks were identified. On-going activities include: development of a flyer on the post-rainy season sorghum value chain and market opportunities, informing financial institutions about business opportunities from post-rainy sorghum, development of training materials (one brochure) on good business practices in accessing finance from alternative sources, and training of farmers on good business practice. The pearl millet milestones are delayed.

43) **Activity 6.6 - Enhance capacity of partners (e.g., NGOs, farmer organizations, private-sector, extension) to deliver appropriate cereal technology options to farmers and increase alternative use of dryland cereals:** In WCA, 16 representatives from Farmer Organization (FO) extension services and NGOs were identified to be trained as trainers, and 14 scientists and research technicians from

NARS and ICRISAT were trained in on-farm participatory breeding. A comprehensive one-week workshop was held in Koutiala in collaboration with the AMEDD NGO. Over 30 participants from Burkina Faso, Mali and Niger, including NARS scientists, farmers and FO agents participated. Training materials were produced for each participant and 5 practical information leaflets for a specific topic and two session reports were produced. In ESA, a training workshop on participatory research (mainly participatory variety selection) and technology delivery for collaborating partners from research, extension, seed production and marketing was held in Singida Tanzania in April 2010. The 41 participants who participated included 13 women and 28 men. Potential partners for seed production and distribution were identified and these included 4 private seed companies and CBSP groups that are managed by each district agricultural office. In Ethiopia, Ethiopian Seed Enterprises (ESE), regional seed enterprises, Ethiopian Seed Association, research institutes, and NGOs have been identified as potential partners for sorghum seed production and are engaged in the 2010 cropping season. Similarly, Eritrea has identified farmer groups, individual lead farmers and the government agencies as avenues for sorghum seed production. A draft training manual on integrated blast management of finger millet was developed and TOT is planned for September and October 2010. In SA, training material (one flyer each) was produced on soil sample collection, post-rainy season sorghum crop management, seed production, village seed systems and grain and stover marketing in the target areas. Other ongoing activities are training of farmers, development of information and organizing field days and these will be delivered in Y2 as scheduled.

(B) Outputs and Milestones

The status of Year 1 outputs and milestones as at 30th June 2010 is presented in Table 1.

(C) Deviation from proposal:

No deviation in all cases except in Activity 4.6 where it is now proposed that milestone 4.6.12 be achieved through secondary data, rather than through surveys, and collection and analysis of soil samples as described in the proposal.

(D) Measurable Outputs and Outcomes: See Appendix A

(F) Knowledge Generated:

- A large body of baseline and experimental / scientific data.
- Production and farmer preference of newly tested sorghum hybrids in WCA and of improved varieties in ESA especially those that exhibit industry specified quality traits.
- Insights into the extent of sol fertility depletion found in women's fields in WCA.
- Insights into the negative effects of the collapse of the cotton sector in Mali on farmers' incomes, reduced availability of draft animals, and non-availability of fertilizers.
- Appreciation by farmers in Tanzania of the potential of early maturing varieties and the need for a viable seed system to ensure availability.
- Data available from diagnostic interviews on cropping systems, major rain fed crops, constraints to production of these crops, infestation levels of *Striga hermonthica* and farmer knowledge of *Striga hermonthica* biology and control in more than 30 intervention villages in Mali and Niger.
- Study data and experience in working with partners.
- Seed production techniques, regulations and procedures, inspection standards and criteria, harvesting, packing and storing techniques and contracting.

(F) Activities that cannot be completed in grant period: None identified in all activities.

Table 1: *Status of Year 1 outputs and milestones as at 30th June 2010*

Objective	Region	No. of Y1 outputs & Milestones Achieved	No. of Y1 Outputs & Milestones Not Achieved	Reasons for Non-Achievement
1	WCA	5	3	- Staffing problems due to delay in recruiting project economist. The budgeted salary for the project economist was not enough to attract suitable candidates, hence the delay. A visiting scientist from a NARS institution has now been engaged for one year; work has now started and is progressing well.
	ESA	15	2	- It is taking longer than expected to identify suitable students in some countries. - Identified students are still developing thesis proposals.
	SA	6	6	- Departure of lead scientist (Dr. KPC Rao) shortly after commencement of project, and delay / long process in recruiting a replacement. A replacement is due to join ICRISAT in Sept 2010. Meanwhile, work on non-achieved outputs is in progress.
2	WCA	27	1	- Milestone 2.7.1 was achieved in Mali but not in Burkina Faso. It took longer than expected for partners in Burkina Faso to sign sub-contract agreements with ICRISAT, hence the delay.
	ESA	11	2	- Delay in signing of sub-contract agreements by partners. Work is now in progress.
	SA	9	2	- Milestone 2.5.11 - The trial was found to be too big to handle. Consequently work focused on screening selected genotypes from the Year 1 evaluation for improving screening efficiency. - Milestone 2.6.1 – The activity commenced late due to a delay in signing sub-contract agreement with MPKV.
3	WCA	6	2	- The project commenced after the start of 2009 rainy season so some activities were moved to the 2010 cropping season. Work is now on-going at 3 on-station and several on-farm sites.
	SA	11	5	- Late hiring of the state university staff to be employed for day-to-day implementation of the on-farm participatory trials in Objectives 3 (and 6).
4	ESA	9	11	- Difference in start of seasons between ESA countries. - Unforeseen delay in (long procedures of) germplasm transfer and gathering of biophysical data in some countries.

				- Milestone 4.7.1 - there was little time between commencement of the project and the start of the season to develop a protocol for use.
5	WCA	3	7	- Delays by NARS partners in signing sub-contract agreements which, in turn, delayed funding to the partners who were to gather information. - Delay in identifying suitable student by partners. - Delay in recruiting a project economist (See explanation under Objective 1 in WCA). - Work on these activities is now on-going.
	ESA	0	7	- Departure of lead scientist (Dr. Bekele Shiferaw) early in the project left a major vacuum which was not filled soon enough. Successor is now in place.
	SA	8	1	- Delay in signing of sub-contract agreements by the partners forced a corresponding delay in commencement of activity 5.3.2
6	WCA	14	14	- The start of the project after the start of 2009 rainy season affected / delayed the commencement of a number of activities in WCA.
	ESA	10	4	- Untimely departure of economist and objective leader (Dr. Richard Jones) affected some activities for awhile, before restructuring was done. The activities are now in progress.
	SA	43	14	- Delay in signing of sub-contract agreements by a number of partners.

Notes:

- Activities leading to outputs and milestones which were not achieved in Year 1 are at various stages of implementation, and are expected to be fully accomplished at various dates between July 2010 and December 2010, in Year 2.

II MANAGEMENT UPDATES

One of the most destabilizing occurrences throughout much of Year 1 was the untimely departure of a few key scientists, including objective leaders. This had the effect of slowing down work in the activities affected. The Project had constantly to re-organize its scientists, recruit new ones and reshuffle those still on board, with a view to ensuring continuity and minimum disruption. Current project management structure is as described below.

- **Principal Investigator:** Dr. Said N. Silim
- **Project Manager / Coordinator:** Dr. George E. Okwach
- **Objective Leaders:**
  - Objective 1: Dr. Nareppa Nagaraj (Based in India)
  - Objective 2: Dr. Eva Weltzien-Rattunde (based in Mali)
  - Objective 3: Dr. SK Gupta (based in India)
  - Objective 4: Dr. Henry Ojulong (based in Kenya)
  - Objective 5: Dr. Alastair Orr (based in Kenya)
  - Objective 6: Dr. Mary Mgonja (based in Kenya)
- **Regional Objective Coordinators**
  - Objective 1
    - WCA: Dr. Jupiter Ndjeunga
    - ESA: Dr. Franklin Simtowe
    - SA: Dr. Nareppa Nagaraj
  - Objective 2
    - WCA: Dr. Eva Weltzien-Rattunde
    - ESA: Dr. Mary Mgonja
    - SA: Dr. Belum Reddy
  - Objective 3
    - WCA: Dr. Bettina Haussman
    - SA: Dr S.K. Gupta
  - Objective 4
    - ESA: Dr. Henry Ojulong
  - Objective 5
    - WCA: Dr. Jupiter Ndjeunga
    - ESA: Dr. Alastair Orr
    - SA: Dr. Parthasarathy Rao
  - Objective 6
    - WCA: Dr. Kirsten Vom Brocke
    - ESA: Dr. Mary Mgonja
    - SA: Dr. Belum Reddy / Dr. Rajan Sharma

III. LESSONS LEARNED:

- The process of negotiating and signing sub-contract agreements with national partners was found to be more complicated and time consuming than earlier envisaged at the time of writing the proposal and launching the project. This process took longer than anticipated, leading to delays in transferring funds to the partners and initiating agreed activities. This was the single most important factor in slowing down the accomplishment of a large number of milestones in year 1.
- Off-season nursery facilities for NARS pearl millet breeding programs of all partner countries in WCA need to be strengthened to enhance seed production and breeding progress.

- Rajasthan's RAU-Bikaner test location is too harsh for pearl millet inbred evaluation, so after attempts to use this site in Y1, it has been dropped in favor of better alternatives.
- Differences in planting dates, between countries and regions, should be considered when drawing timeframes for the activities.
- Timely dispatch of resources is essential for proper implementation of activities.
- Some partners need guidance and capacity strengthening in carrying out project activities. Heavy administrative procedures faced by some partners (such as universities in India) may constrain the smooth implementation of project activities.
- Scientists from the NARS have little time or priority to review documents. In some cases this may be due to language challenges, such as Francophone NARS partners receiving documents written in English.
- Seed packs need to be sufficient to plant a reasonable area. It is proposed that packs sufficient for 0.5 ha should be the minimum size.
- It has not been clear whether the mini-packs be sold at market price or at a subsidized price and the implications for sustainability.
- Isolation distances may be a challenge where farmers have small landholdings.
- There is a need to strengthen private seed companies to enhance sustainability.
- Training should be a recurring activity for the trainees to grasp and practice the knowledge gained.
- There is a need to understand seed policy and regulations in each country to ensure that project actors adhere to the regulations.

IV. CHANGES:

No changes within ICRISAT, but the reforms taking place in the CGIAR around mega program development; specifically MP3: Dryland Cereals, have implications for the HOPE project since this MP will include sorghum, pearl millet and finger millet. This will have a positive impact as it will build and expand on the work funded under the HOPE Project. For example, in ESA the Project covers parts of Ethiopia, Tanzania and South Sudan for sorghum and MP3 will likely expand work in these countries in addition to Sudan, Mozambique, Botswana and Zimbabwe, where the HOPE Project is not presently located. MP3 will benefit from the analysis of constraints and opportunities that has been conducted under the HOPE Project.

V. RISKS:

- Staff changes: The untimely departure of a number of project scientists adversely affected the continuity and timeliness of planned activities. When this happened, ICRISAT responded by (1) immediately re-organizing its staff to ensure that the work progressed, and (2) initiating the process of recruiting new staff to fill the vacancies created.
- Many national / partner institutions took longer than expected in signing sub-contract agreements. This resulted in the late transfer of funds, and corresponding late commencement of planned activities.
- Crop failure in some countries.

APPENDIX A - OBJECTIVES AND OUTCOMES

OBJECTIVE 1

Vision of Success:	During the first phase, the HOPE Project will improve the productivity of sorghum, pearl millet and finger millet by 35-40% through introduction of improved technologies and market innovations that increase adoption and profitability to 110,000 households in sub-Saharan Africa (SSA) and 90,000 in South Asia (SA). Within ten years the project will benefit 1.1 million households in SSA and 1.0 million in SA.		
Project Objective 1:	**Targeting opportunities for technology development and delivery to maximize adoption and impacts of innovations on livelihoods in WCA, ESA and SA**		
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**
Activity 1.1 Targeting innovations for up-scaling and for reaching resource poor farmers	**WCA:** • Geographic Information System (GIS) database collated with crop statistics (Y1) • GIS maps for sorghum and pearl millet based on biophysical and socio economic characteristics developed and available (Y2) • Maps of recommendation domains for sorghum (Burkina Faso, Mali, Nigeria) and pearl millet varieties (Burkina Faso, Mali, Niger, Nigeria) (Y3) • Regional situation and outlook reports developed for sorghum and pearl millet (Y4) **ESA:** • Target areas within the crop growing regions in each country and hot-spot testing sites for the project selected and defined with partners (Y1) • Profitability of selected sorghum and finger millet varieties evaluated using APSIM model for different environments in target countries (Y2) • Regional situation and outlook reports for		**WCA** • Data on sorghum and pearl millet grown at the level of "department" were collected by partners in Niger, Mali, Burkina Faso and Nigeria. Time series data on various crops from 1995-2008 in Niger; 1998/99 - 2007/08 in Mali, and 1999 - 2008 in Burkina Faso. • Work in progress to geo-reference map sorghum and pearl millet production, area and yield at the "department level" in Niger and regional level in Mali. Data collected in Niger and Mali on major markets is being mapped. Data on soils are drawn from FAO maps. **ESA** • Criteria for selection of target areas was documented and shared with partners. • Target areas were selected in Ethiopia, Tanzania, Southern Sudan, Uganda, Eritrea and Kenya. • Crop production data for sorghum and finger millet at district levels was collected for Ethiopia

	sorghum and finger millet developed (Y3) • Maps of impact target domains developed for selected varieties for sorghum (Eritrea, Ethiopia, Tanzania,) and finger millet (Ethiopia, Kenya, Tanzania, Uganda) to inform technology diffusion and shared with partners (Y4) **SA:** • Database on post-rainy season sorghum and pearl millet updated till 2006-07 (Y1) • GIS maps for post-rainy season sorghum and pearl millet areas developed based on biophysical and socio economic characteristics (Y2) • Regional situation and outlook reports for *rabi* sorghum and pearl millet developed (Y3) • Maps of recommendation domains for sorghum (Maharashtra) and pearl millet (Gujarat, Haryana, Rajasthan) varieties (Y4)		and Tanzania. Work is in progress to overlay biophysical and socio economic characteristics on GIS maps. **SA** • Time series data on post-rainy season sorghum and pearl millet at district level updated to 2007-08. • Work is in progress to overlay biophysical and socio economic characteristics on the GIS maps developed for post-rainy season sorghum and pearl millet.
	Targeted Outcomes	**Baseline**	**Progress (Y1)**
	Short term: • Project scientists and development planners use GIS maps to select and target technologies to disseminate in specific intervention areas • Project scientists make informed decisions • Policymakers and development planners better prioritize R&D interventions based on the policy briefs and situation and outlook reports **Long term:** • Policymakers use the situation and outlook reports for research and development decision making • Policymakers and development planners better target R&D interventions to enhance future impacts		Process ongoing.

Activities	Targeted Outputs	Baseline	Progress (Y1)
Activity 1.2: Analysis of investment opportunities for research and development in crop improvement (CI), crop management (CM) and market access (MA)	**WCA:** • A set of feasible R&D investment options identified for sorghum (Burkina Faso, Mali and Nigeria) and pearl millet (Burkina Faso, Mali and Nigeria) and prepared for economic analysis (Y2) • Potential impact of the introduction of specific sorghum or pearl millet technologies estimated for sorghum (Nigeria) and pearl millet (Niger) (Y3) **ESA:** • Potential impact of promotion of available technologies estimated for finger millet in Tanzania and sorghum in Ethiopia (Y3) • Economic benefits from targeting research investments on alternative biotic and abiotic stresses for new variety development (supported by APSIM modeling) and market constraints for sorghum (Ethiopia and Tanzania) and finger millet (Ethiopia and Tanzania) analyzed (Y3) **SA:** • Ex-ante Impacts of available crop technologies estimated for post-rainy season sorghum in		**<u>WCA</u>** • Literature on investment options ready for dissemination in all countries except Nigeria. Includes sorghum and pearl millet varieties and hybrids (NAD-1 in Niger), and management options that can contribute to productivity gains. **<u>ESA</u>** • Data on existing technologies is being collected in preparation for an analysis of potential impact of promotion of available technologies. **<u>SA</u>** • Available technologies for post-rainy season sorghum in the Marathwada region, adoption rates, yield increase and impacts documented. Draft report under review. • Preparation of ex ante impact assessment report once all the available technologies including those for pearl millet are documented.

	Maharashtra and for pearl millet in Gujarat, Haryana and Rajasthan assessed(Y2) • Report on impact of potential crop technologies prepared for post-rainy season sorghum (Maharashtra) and pearl millet (Gujarat, Haryana ar Rajasthan) (Y3)		
	Targeted Outcomes	**Baseline**	**Progress (Y1)**
	Short term: • Project scientists and partners visualize alternative investment opportunities that enhance impacts • Better targeting of research investments during future phases of the project **Long term:** • Policymakers and stakeholders use ex-ante analysis to target investments that offer highest impacts Project scientists and policy makers prepare an out scaling strategy with proven varieties and technologies		Process ongoing.
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**
Activity 1.3: Conduct of baseline surveys for characterization of farmers, their trait preferences, input output levels and profitability of dry land cereals vis-à-vis competing crops	**WCA:** • Household baseline data collected from target impact areas with proper counterfactuals for sorghum (Nigeria, Mali) and pearl millet (Niger) (Y3) • Report on socio-economic and poverty profiles, technology preferences, etc based on analysis of baseline household data for sorghum (Nigeria, Mali) and pearl millet (Niger) (Y4) **ESA:** • Baseline data collected from household surveys		**<u>WCA</u>** • Baseline surveys have been conducted in Northern Nigeria. A total of 1134 households were interviewed. Questionnaires focused on several modules including household socio-economic and demographic characteristics, land stocks, agricultural equipment, varieties grown during the last 5 years, use of technologies (apart from varieties), plot data, marketing of cereals, household durable assets, utilization of cereals, desirable pearl millet and sorghum

	from target areas for sorghum (Ethiopia, Tanzania) and finger millet (Ethiopia, Tanzania) (Y2) • Baseline study report on socio-economic and poverty profiles, technology preferences, etc based on analysis of baseline household data for sorghum (Ethiopia, Tanzania) and finger millet (Ethiopia, Tanzania) (Y3) **SA:** • Baseline data collected from 1080 households from target locations in Maharashtra for post-rainy season sorghum and Gujarat, Haryana and Rajasthan for pearl millet (Y2) • Report on socio-economic and poverty profiles technology preferences, etc based on analysis baseline household data prepared for post-rai season sorghum (Maharashtra) and for pearl mil (Gujarat, Haryana and Rajasthan) (Y3)		traits, non-farm activities and credit transactions. Data is being analyzed. • In Niger and Mali, villages have already been selected. Village and household questionnaires have been developed and shared with NARS economists and ready for implementation. **ESA** • Survey instruments designed and developed for collection of baseline information from beneficiaries of the target areas and shared with partners. • Sample design, in consultation with partners, to carry out baseline surveys finalized. • Baseline data collection to commence from July in Ethiopia. **SA** • Survey instruments designed and developed for collection of baseline information from beneficiaries of the target areas and shared with partners. • Sample design, in consultation with partners, to carry out baseline surveys finalized. • Baseline data collection to commence from July 2010.
	Targeted Outcomes	**Baseline**	**Progress (Y1)**
	Short term: • Project scientists thoroughly understand ground realities and are able to plan the interventions for the desired impacts • Project scientists and partners meeting project targets • Constraints to activity implementation identified		Process ongoing.

	and timely corrective measures initiated through adaptive learning **Long term:** • Efficient and effective project implementation • Increased technology adoption and greater impact of the project		
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**
Activity 1.4: Monitoring and evaluation of adoption and impact	**WCA:** • Gender plan prepared for proactive involvement of women in the implementation of the project (Y1) • Monitoring framework developed for selected indicators of project outcomes and impacts (productivity, production, income, vulnerability, food and nutrition security) (Y3) • Adoption surveys conducted and constraints and opportunities identified in selected project target areas/countries and shared with partners (Y4) **ESA:** • Gender plan prepared for proactive involvement of women in the implementation of the project (Y1) • Monitoring framework developed for selected indicators of project outcomes and impacts (productivity, production, income, vulnerability, food and nutrition security) (Y1) • Adoption levels monitored and report on early adoption levels and constraints documented for selected countries (Y4) • Report on the evaluation of on-farm trials and demonstrations of new technologies developed (linked to objectives 2 to 4) (Y4)		**WCA** • A draft gender plan for WCA is under review. • Monitoring framework developed and selected monitoring indicators identified. **ESA** • A draft gender plan for ESA is under review. • Monitoring framework developed and selected monitoring indicators identified. **SA** • Monitoring framework developed and selected monitoring indicators identified. • Information on a few key indicators collected, for example, yields and marketed surplus from sample beneficiaries.

	SA: • Gender plan prepared for proactive involvement of women in the implementation of the project (Y1) • Monitoring framework developed for selected indicators of project outcomes and impacts (productivity, production, income, vulnerability, food and nutrition security) for post-rainy season sorghum and pearl millet (Y1) • Adoption levels monitored and report on early adoption levels, impacts and constraints documented for the target states (Y3) • Report on the evaluation of on-farm trials a demonstrations of new technologies developed (link to objectives 2 to 4) (Y4)		
	Targeted Outcomes	**Baseline**	**Progress (Y1)**
	Short term: • Project scientists learn about what is working and what is not? • Policy makers invest on more effective interventions **Long term:** Project scientists and policy makers develop an out scaling strategy to reach more farmers		Process on-going.
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**
1.5: Human resource development and policy dialogue to enhance targeting, adoption and impact of sorghum and millet technologies	**WCA:** • 1 MSc student from NARS trained in marketing in Niger in local universities (Y1) • 4 NARS scientists (Nigeria, Mali, Burkina Faso and Niger) will be trained in survey design, data collection methods and scientific writing (Y1) • 10 scientists trained on Impact assessment of technologies and innovations (Y4)		**WCA** • One student from "Universite Abdou Moumouni de Niamey, Niger" has been identified to work on sorghum and pearl millet marketing (focus on the region of Tillabery). • Training of 4 NARS scientists (Nigeria, Mali, Burkina Faso and Niger) in survey design, data collection methods and scientific writing has

	• One MSc student from Niger trained in development economics in a local university (Y2) • Regional workshop to share findings from baseline surveys, adoption monitoring and impact studies (Y4) **ESA:** • About 5-8 lead socio-economists from Ethiopia, Kenya, Tanzania and Uganda trained on survey design and data collection methods (Y1) • Two university registered MSc students from target countries supported to complete their theses on adoption and impact of sorghum and finger millet technologies in Ethiopia and Tanzania (Y3) • In-country workshop (Ethiopia, Tanzania) and policy brief to share findings from baseline surveys, adoption monitoring and impact studies (Y4) **SA:** • 15 Partners from Maharashtra, Gujarat, Haryana and Rajasthan trained on survey design and data collection methods (Y1) • Completion of training on adoption, monitoring and impact assessment for 15 scientists (Y2) • Two MSc students, one each from Marathwada Agricultural University/MPKV, Rahuri and GAU/RAU trained on preparing dissertations assessing the adoption and impact of sorghum and finger millet technologies (Y3) • Organization of regional workshop to share baseline, adoption, monitoring and impact surveys (Y4)		not been done. However, NARS economists from the 4 countries have been identified and will be trained in November 2010. They will use the data collected in their respective countries as support material for training. **ESA** • Training materials developed on survey design and data collection methods. • Five lead socio- economists trained in Tanzania and 6 trained in Ethiopia on survey design and data collection methods. **SA** • Available training material re-designed to meet the objectives of the HOPE project. • One Masters student identified to work on an Objective 1 related topic for his thesis. • Identification of stake-holders for training is in progress.
	Targeted Outcomes	**Baseline**	**Progress (Y1)**

	Short term: • Trainees from NARS, with their strengthened capacity, are able to undertake baseline and monitoring surveys effectively in order to gauge the adoption and impacts. • Policy makers made aware of the neglected potential of dry land cereals and constraints to technology adoption **Long-term:** • NARS scientists use appropriate methods to assess impact of technologies and innovations in their institutions Policy makers implement new programs to address adoption constraints		Process ongoing.

OBJECTIVE 2

Vision of Success:	During the first phase, the HOPE Project will improve the productivity of sorghum, pearl millet and finger millet by 35-40% through introduction of improved technologies and market innovations that increase adoption and profitability to 110,000 households in sub-Saharan Africa (SSA) and 90,000 in South Asia (SA). Within ten years the project will benefit 1.1 million households in SSA and 1.0 million in SA.		
Project Objective 2:	**Improve sorghum cultivars and management options to increase productivity in SA, ESA and WCA**		
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**
Activity 2.1: Identify new sources of resistance / tolerance to and control options for key biotic constraints	**WCA** • Sources of midge resistance validated (Y4) • Epidemiology of sorghum midge better understood (Y4) **ESA** • Two new sources of sorghum *Striga* resistance identified and existing sources validated by Y3 • Sources of midge resistance validated by Y4 **SA** • Sources of aphid resistance (6) identified (Y3) • Sources of shoot fly resistance identified (10 to 12 lines) and mechanisms of resistance delineated (Y4)		**WCA** • Seed of midge resistance sources has been multiplied in all three regions and at several stations. Seed exchanged across regions for trials. • Sites for field observations have been identified with partners in Niger. **ESA** • In Ethiopia, Eritrea and southern Sudan, a total of 493 farmer varieties have been collected in *Striga* endemic areas. • Seed of midge-resistant cultivars from CIRAD/France has been received through ICRISAT-Mali. **SA** • Aphid screening technique standardized and putative sources of aphid resistance screened. • Sources of shoot fly resistance multiplied.

	Targeted Outcomes		Progress (Y1)
	Short term • Sorghum breeders use a range of different sources for *Striga,* midge, shoofly and aphid resistance breeding • Researchers develop efficient and effective integrated insect management options • New actors can be attracted to the development of sustainable insect pest control options **Long Term** • Sorghum breeders use a range of methods for improving *Striga*, midge, shootfly and aphid resistance • Stability of resistance to key insect pests improved • Farmers' production risks reduced • Farmers use more sustainable crop production practices		• Breeders in Burkina Faso, Ghana, and Nigeria have requested varieties and breeding lines with *Striga* resistance. • Breeders in Burkina Faso, Ghana, and Benin have requested varieties with midge resistance for use in their breeding programs. • Marker assisted selection for *Striga* resistance is being tried by NARS in Mali, Kenya, Eritrea and Sudan.
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**
Activity 2.2. Identify options for sorghum intensification in target ecologies	**WCA** • Response of new photoperiod sensitive sorghum hybrids to a wide a range of production conditions, including women's fields (low to high input) understood (Y3) • Productivity and stover quality of new dwarf plant type varieties characterized and discussed with farmers (Y3) **ESA** • A set of 10 cultivars diverse for growth and flowering, evaluated in a range of latitudes to determine response to photoperiod to provide knowledge for development of improved and		**WCA** • In Mali, IER and ICRISAT have conducted on-station trials (3 sites) and in 10 villages with 40 farmers. Trials evaluated for crop performance, farmer preference, and for culinary qualities. • Stover samples of new plant type taken, stover yields measured, and samples sent for NIRS analysis, but results have not yet been received. **ESA** • Morpho-agronomic data were collected on monthly sowing of 10 sorghum varieties with varying photoperiod responses and adaptation.

	adaptable photosensitive varieties (Y3) • Ten varieties identified and tested for their performance under low soil fertility and moisture stress conditions in Ethiopia, Eritrea and Tanzania (Y4) **SA** • Possible mechanisms of tolerance to low temperatu on crop growth and economic yields documented (Y3) • Role of temperature on seed setting (to help in avoiding areas with low temperatures and select locations for crop production and seed multiplication) documented (Y4)		**SA** • Ten post-rainy adapted R-lines with varying maturity dates were evaluated in two sowing dates.
	Targeted Outcomes	**Baseline**	**Progress (Y1)**
	Short term • Variety adaptation domains specified • Breeders target drought avoidance effectively for specific target regions • Researchers target efforts to reduce farmers' risks o crop failure due to drought (and climate change) • Dissemination of new sorghum hybrids facilitated through better targeting of recommendation domain • Women farmers in WCA and SA use crop management options suitable to overcoming their specific constraints • Development agents use new approaches for facilitating dryland cereal intensification **Long term** • Breeding strategy for photoperiod sensitive sorghums adapted to improve chances of genetic		• Breeders have started to use new tools for the analysis of multi-location trials, and are recognizing and examining more critically their available data for sites and varieties. • Partners interested in variety dissemination are starting to ask for varieties for specific ecologies.

	gain • Increased sorghum production by women in Mali and WCA, and SA • Increased food security and nutritional status of young children in Mali and WCA • Economic returns from sorghum production in WCA, ESA and SA increased • Improved integration of crop farming with livestock management in the Sudanian zone of Mali and WC		
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**
Activity 2.3. Identify new and characterize already available hybrid parents for target ecologies	**ESA** • Morpho-agronomic data, disease and pest reactions of the commonly used and available hybrid parents analyzed/ synthesized and documented for future us by national DUS test guidelines descriptors (Y3) • A post graduate student advised and genetic diversi of the 15 inbred lines determined using morphological and molecular markers (Y4) **SA** • New maintainers (25) under conversion in BC4 stag identified (Y4) • New A-/B-lines (6) developed for agronomic traits, grain traits, seed setting and charcoal rot tolerance and shoot fly resistance for further utilization in hybrid programs in target agro eco regions (Y3) • Promising new R-lines (20) identified for agronomi traits, grain traits, seed setting and charcoal rot tolerance and shoot fly resistance under receding so moisture conditions identified for further utilization		**<u>ESA</u>** • Seed of 127 existing seed parents for the dry lowland areas has been increased, and sent to two dry lowland sites for evaluation. • A PhD student has been identified to conduct a diversity study on hybrid parents. **<u>SA</u>** • Seed of advanced generation potential B-lines (maintainers) was provided to partners in Sholapur for testing, and for creating new testcrosses. • 38 new B-lines, adapted to the post-rainy season environment were evaluated in detail at ICRISAT-Patancheru for productivity, charcoal rot and aphid resistance. • 323 advanced potential restorer lines were evaluated. Selections were made based on bold and lustrous grain and yield. The same lines

	in hybrid programs (Y4)		were test-crossed.
	Targeted Outcomes	**Baseline**	**Progress (Y1)**
	Short term • NARS breeders aware of tools for MABC and effective screening methods for biotic stresses • NARS breeders identify experimental varieties with significantly improved yielding ability, and good adaptation for specific ecologies • Partner express interest in dual purpose sorghums fo the Sudanian zone of WCA **Long term** • Increased sorghum productivity and production stability • Improved fodder availability • Broadened genetic base among cultivars and better crop-livestock integration		Nothing identifiable at this stage.
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**
Activity 2.4 Develop hybrids with improved yielding ability and adaptation traits for specific target regions	**WCA** • Three hybrids identified for large scale disseminatio with private sector in Mali (Y2) • Six new hybrids produced for large-scale evaluation in Sudanian zone in Mali and Burkina Faso (Y3) • Hybrid seed production techniques developed for specific parental combinations and growing conditions in Mali (Y3) **ESA** • 12 experimental hybrids for the Dry Lowland (DL) and Sub Humid (SH) agro-ecologies identified in Tanzania and Ethiopia (Y4) • Hybrid seed production feasibility tested for specifi parental combinations and growing conditions in Ethiopia and Tanzania (Y3)		**WCA** • Four hybrids have been registered nationally in Mali. Those and three newly identified ones are now being multiplied. • 28 hybrids are presently in advanced stages of evaluation in the Mali Sudanian zone. • Techniques have been developed for four hybrids, and the experience is being extended to the other new hybrids. **ESA** • 390 testcrosses were made for the dry lowland and sub-humid sorghum ecologies (far exceeding the planned numbers) using a wide range of A-lines including sweet sorghum A/B lines. About 50% of the hybrids showed 100%

	SA • Eight promising new hybrids developed for on-farm trials in the target areas (Y4) • Two hybrids multiplied for large scale testing in target areas (Y4) • Hybrid seed production technology standardized for the selected hybrids (Y4)		fertility restoration. **SA** • 484 new hybrids were created using known A-lines adapted to post-rainy season conditions, and know R-lines from national partners. • Eight hybrids with a grain yield ranging from 4.4 to 5.9 t ha^{-1} were significantly superior to the popular check. • The seed of superior hybrids was multiplied.
	Targeted Outcomes	**Baseline**	**Progress (Y1)**
	Short term • NARS breeders aware of tools for MABC and effective screening methods for biotic stresses • NARS breeders identify experimental varieties with significantly improved yielding ability, and good adaptation for specific ecologies • Partner express interest in dual purpose sorghums for the Sudanian zone of WCA **Long term** • Increased sorghum productivity and production stability • Improved fodder availability • Broadened genetic base among cultivars and better crop-livestock integration		Nothing identifiable at this stage.
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**
Activity 2.5. Develop open-pollinated varieties with improved yielding ability, and resistance to the predominant biotic and abiotic stresses in target ecologies	**WCA** • 15-30 varieties created for multi-location testing in the S. Sudanian (Y2) and N. Sudanian (Y4) zones, including one for high Fe and Zn content • Second cycle of recurrent selection in Guinea race dwarf population for S. Sudanian zone completed in WCA (Y3) **ESA**		**WCA** • Open pollinated varieties are being developed using recurrent selection procedures, involving the ms 3 gene, in Mali and Burkina Faso. Results for iron and zinc content indicate that the guinea race materials have a higher chance of elevated mineral levels. **ESA**

	• Segregating breeding populations for the dry lowlands and the sub-humid ecologies created (Y3) • Stay-green QTL introgressed materials field tested i Ethiopia (Y3) • Five varieties identified for participatory evaluation of variety by management options for the sub-humi (SH) areas of Tanzania (Y3) • Five varieties identified for participatory evaluation of varieties by management options for the dry lowland (DL) areas of Tanzania, Eritrea and Ethiopia (Y4) • 30 lines identified for detailed evaluation and/or purification for higher rainfall areas of southern Sudan (Y4) **SA** • Fifty F_5 progenies obtained for agronomic and grain traits, shoot fly resistance, tolerance to charcoal rot and terminal drought (Y4) • Third random mated $ms_{7/3}$ post rainy season population developed for initiating recurrent selection (Y4) • Eight lines with good grain appearance, superior grain and stover yield, terminal drought and charcoa rot tolerance and shoot fly resistance identified (Y3		• In Kenya and Sudan, the project has advanced seed multiplication of backcross lines with a varying number of *Striga* resistance QTLs into local varieties from all countries. Backcross lines for the introgression of stay-green QTLs have been advanced and tested for the presence and absence of specific QTLs. • Seed has been multiplied for detailed multi-location evaluation in Ethiopia, Sudan and Mali to study the effects of the transferred QTLs. • For the sub-humid zone of ESA, newly obtained midge resistant lines have been evaluated for grain yield as well as stem borer and foliar disease resistance. • Sites have been identified at Torit (eastern equatorial) and Juba (central equatorial) in southern Sudan for experiments in 2010. **SA** • 140 post-rainy season sorghum varieties were evaluated at ICRISAT-Patancheru and compared to two check varieties.
	Targeted Outcomes	**Baseline**	**Progress (Y1)**
	Short term • NARS breeders aware of tools for MABC and effective screening methods for biotic stresses • NARS breeders identify experimental varieties with significantly improved yielding ability, and good adaptation for specific ecologies • Partner express interest in dual purpose sorghums fo the Sudanian zone of WCA		Breeders in Mali, Kenya, Eritrea and Sudan are using MABC for *Striga* resistance. Recurrent selection protocols have been discussed with partners. Productivity data on new breeding lines is encouraging and stover quality appreciated by farmers.

	Long term • Increased sorghum productivity and production stability • Improved fodder availability • Broadened genetic base among cultivars and better crop-livestock integration		
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**
Activity 2.6. Develop crop management options for key productions constraints in target sorghum production ecologies	**WCA** • Integrated practices for *Striga* and soil fertility management tested with farmers in the Sudanian zone in Mali (Y4) • Options for sustainably improving sorghum productivity with a focus on women's fields developed in Mali (Y3) **ESA** • Recommendations of integrated soil fertility and water management practices developed and validate in Eritrea, Ethiopia ,Southern Sudan and Tanzania (Y4) • Integrated *Striga* and weed management options developed, tested and documented for / in Eritrea ar Tanzania (Y4) **SA** • Integrated shoot fly management options fine tuned for various production areas (Y2) • Cultural practices to manage terminal drought identified (Y2) • Crop production practices (fertilizer requirements, spacing and time of sowing) for enhanced productivity assessed (Y4)		**WCA** • Testing of integrated *Striga* management (ISM) has been initiated for sorghum in the Sudanian zone, based on experience with pearl millet in the Sahelian zone. • Experimentation in women's fields is targeting issues related to intercropping with legumes and soil fertility management. New insights have been gained on the status of women's fields. **ESA** • A desk study to define specific agronomy treatments for on-farm experimentation has been completed. • A protocol for testing these treatments for the dry lowland production system in Ethiopia has been finalized and farmers have been chosen at the Mieso and Kobo communes. **SA** • Trials on sowing dates of post-rainy season sorghum intercropped with safflower and deep sowing with deep placement of fertilizer were conducted on-station in the target region by project partners.
	Targeted Outcomes	**Baseline**	**Progress (Y1)**

	Short term • A wider range of proven, effective *Striga* management options made available to farmers in specific target ecologies • Management options suitable to women farmers' fields will be disseminated • Dissemination of management and mechanization options for sustainable sorghum production • Dissemination of management and mechanization options for sustainable sorghum production **Long term** • Improved sorghum productivity in women's fields • Improved food security of young children • Improved sorghum productivity in target ecologies		ISM options are starting to spread in the Sahelian zone among sorghum farmers. The demand for ecology specific control tools is growing rapidly.
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**
Activity 2.7. Farmer participatory multi-environment testing of newly developed sorghum varieties with crop management options in target ecologies	**WCA** • Three varieties identified for detailed farmer evaluation in each target area in each target area (Yearly) • Three varieties characterized for their adaptation to specific growing conditions, G x E interactions and marketing potential in eight partnership areas, and a least one sorghum variety identified for delivery in each target areas (Y3) • Lessons learned and best practices for effective large-scale farmer participatory trial management fo integrating variety and crop management options published (Y4) **ESA** • Four varieties evaluated with 3 fertility and crop management options in the dry lowlands of Eritrea, Tanzania and Ethiopia (Y4) • Three varieties evaluated with 3 fertility and crop		**WCA** • Varieties for detailed evaluation have been identified and trials commenced with 324 farmers for integrated variety and crop management testing. Additional variety trials have been identified. Seed demand for new varieties is increasing and is being monitored. **ESA** • Existing farmer field schools were identified for the work in Tanzania; 15 farmers in each of the 4 districts in Tanzania have evaluated 2 varieties chosen from a set of four with improved agronomic practices. • In Ethiopia and Eritrea, trials have been planned and distributed for the 2010 growing season. **SA** • In the post-rainy season areas, first results have

	management options in the sub-humid areas of Tanzania and 1 variety recommended for release an 20 kg of seed produced for further seed increase (Y **SA** • Most promising cultivars (two varieties) identified with the help of farmers for cultivation by farmers (Y4) • Best bet practices for enhanced productivity identified with the help of farmers in target areas (Y3) • Selected women and men farmers knowledge in assessing the cultivars and management practices enhanced (Y4)		attracted the attention of the seed industry. • 200 kg of seed of each of four new/advanced lines was produced for farmer participatory trials. • At MAU and MPKV, new varieties were identified for farmer participatory varietal (FPV) trials for the 2010-11 season with 15 kg of seed of each variety produced.
	Targeted Outcomes	**Baseline**	**Progress (Y1)**
	Short term • 30% of farmers in pilot sites using new varieties and/or crop management practices • Varieties and hybrids available for dissemination by private and public sector partners • Average yield increase of 40% among early adopter of integrated cropping techniques • R&D partners have capacity to conduct participator trials on a large scale • Increased awareness of NARS and farmers on improved cultivars and management options **Long term** • Sustainable and profitable increases in dryland sorghum production • National breeding programs effectively target farmer-preferred traits		• Dissemination studies initiated in a few villages; some have adoption rates of new varieties that approach the targeted number. More detailed analysis is on-going. • Private enterprises, managed by farmers, are developing, seed is becoming more available and is in higher demand (see Objective 6 report)
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**
Activity 2.8. Enhancing	**WCA**		**WCA**

research and leadership skills of sorghum scientists	• Graduate students advised in sorghum breeding, genetic and natural resource management research, including integrated *Striga* management (Y4) • NARS partners trained in statistical analysis and recurrent selection for population improvement (Y4 **ESA** • Post graduate students identified, TOR for consultants to provide training on MET and GXE agreed on and case study data sets compiled (Y2) • Capacity of breeders for product development and deployment of African Biofortified Sorghum enhanced in ESA (Y3) • 15 NARS, and interested private sector breeders and technicians trained in all steps of sorghum hybrid parent and product development, seed production and marketing (Y3) • 12 NARS and extension staff who are project partners trained in implementation of large-scale farmer managed trials and facilitation of Farmer Learning Centers in target areas (linked to objective 6) (Y3) • 12 NARS and partner breeders in Eritrea, Ethiopia, Tanzania and southern Sudan trained in conducting Multi Environment Trials and data analyses and manuscript developed (Y4) • Two post graduate trained-one in sorghum improvement and another in integrating crop varieties/management and crop modeling technique advised and draft thesis available (Y4) **SA** • Training materials developed and master trainers trained n improved crop cultivars, agronomic practices and integrated pest management and		• Graduate students have been identified and registered, as well as undergraduate students. • Statistics training courses have been conducted in all three regions. **ESA** • In both ESA and WCA, the ICRISAT biometrician conducted a training course on analysis of multi-location variety trials, using the Genstat software focusing on multi-variate statistical tools, such as GGE and AMMI biplots, as well as graphical tools. **All Regions** • Specific training workshops and sessions to adapt and apply protocols for conducting farmer managed variety by agronomic treatment trials were held with all partners in each region.

	drought management (Y3) • Training material developed in local language and researchers, field staff and farmers trained on seed production aspects and village seed systems and visual documentation of seed production aspects (Y4))		
	Targeted Outcomes	**Baseline**	**Progress (Y1)**
	Short term • Better trained personnel available for future sorghu improvement research, and delivery of results • Scientists are well informed of policies and regulation governing seed materials **Long term** • Sustainability of NARS sorghum improvement programs enhanced		The G x E training course was very well received and scientists are starting to use some of the tools.

OBJECTIVE 3

Vision of Success:	During the first phase, the HOPE Project will improve the productivity of sorghum, pearl millet and finger millet by 35-40% through introduction of improved technologies and market innovations that increase adoption and profitability to 110,000 households in sub-Saharan Africa (SSA) and 90,000 in South Asia (SA). Within ten years the project will benefit 1.1 million households in SSA and 1.0 million in SA.		
Project Objective 3:	**Improve pearl millet cultivars and management options to increase productivity in WCA and SA**		
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**
Activity 3.1. Identify new sources of resistance to key biotic constraints, validate these resistance sources, determine resistance inheritance and where necessary identify markers as a selection aid	**WCA** • Flanking markers for pearl millet *Striga* resistance QTLs identified (Y3) **SA** • Newly emerging downy mildew strains identified from target region (Y2) • Sources of resistance to newly emerging downy mildew strains identified (Y2) • Flanking markers identified for major genes contributing to resistance to newly emerging downy mildew strains (Y3)		**WCA** • 139 lines of the wild × cultivated pearl millet *Striga* resistance mapping population have been advanced to F4 at ICRISAT-Niger. **SA** • Samples of downy mildew populations have been collected from pearl millet hybrids growing in farmers' fields in the Indian states of Haryana, Rajasthan and Gujarat, and representative isolates established under greenhouse conditions at ICRISAT during the first half of 2010.

	Targeted Outcomes	**Baseline**	**Progress (Y1)**
	Short term • Pearl millet breeders using a wider range of sources for downy mildew resistance in inheritance studies and applied breeding • Use of molecular markers in applied downy mildew and *Striga* resistance breeding **Long term** • Pearl millet breeders use a range of methods for improving resistance to downy mildew and *Striga* • Stability and durability of resistance to key biotic constraints improved • Improved cultivars available to be incorporated into IGNRM strategies • Reduced downy mildew and *Striga* incidence and increased yields due to cultivation of resistant cultivars • Farmers' production risks due or biotic constraints reduced		Outcomes expected from Y2.
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**
Activity 3.2. Identify integrated control options for pearl millet insect pests	**WCA** • Impact of various crop residue and soil management techniques on MHM (*Heliocheilus*) and associated natural enemies and other macrofauna documented (Y3) • Impact of improved integrated soil, nutrient and pest management techniques on MHM infestation and damage assessed in Niger (Y4)		**WCA** • Study conducted to assess the impact of four different pearl millet crop residue management treatments on incidence of insect pests. • A preliminary survey conducted during millet harvest at the INRAN research stations of Konni and Kollo, in WCA, to identify a second site for millet residue management studies.

	Targeted Outcomes	**Baseline**	**Progress (Y1)**
	Short term • Use of this knowledge in development of farmer-affordable integrated pest management options **Long term** • Reduced insect damage and higher yields through application of integrated pest management techniques		Too early to show outcomes – Outputs expected in Y3.
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**
Activity 3.3. Identify options for pearl millet intensification in target ecologies for effective implementation of IGNRM	• WCA • Best-bet soil fertility management options and their interactions with genotype identified for Sahelian zone of Niger (Y4) **SA** • Report on pearl millet response to micronutrient (Zn, B and S) fertilization, with recommendations of treatments to test on-farm (Y3)		**WCA** • Seed was produced and a protocol developed to test 16 soil fertility management options with 10 different pearl millet cultivars, on-station at ICRISAT-Sadore, INRAN-Kollo and INRAN-Maradi. **SA** • A multi-year study of response to $ZnSO_4$ micronutrient fertilization has been summarized and best-bet treatments selected for on-station micronutrient response trials to be conducted during the 2010 rainy season.

	Targeted Outcomes	**Baseline**	**Progress (Y1)**
	Short term • Information on crop genotype interactions with micro-dosing of macronutrients and micronutrients used by researchers to design approaches that avoid soil mining **Long term** • More targeted cultivar deployment and better exploitation of specific adaptation results in improved on-farm yield and yield stability • Economic returns from pearl millet production increased • Farmers able to better conserve the natural resource base of their farms through sustainable use of micronutrients		Too early to show outcomes – Outputs expected in Y3 in SA and Y4 in WCA.
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**
Activity 3.4. Strengthen national program capabilities for screening for resistance to key biotic constraints	**WCA** • Potted seedling downy mildew resistance screening facilities established at ICRISAT-Sadoré for use in recurrent selection (Y3) **SA** • Greenhouse downy mildew seedling screening facilities established at three sites (one each in Gujarat, Haryana and Rajasthan) (Y2), and partners trained in their use (see Activity 3.9 below) (Y2)		**WCA** • An ICRISAT-Niger research assistant trained at ICRISAT-India in use of potted seedling screens for downy mildew resistance assessment. • Downy mildew screening facilities have been improved at ICRISAT-Niger using available greenhouses. • On-the-job exposure of national partners from Niger as part of our research collaboration. **SA** • On-the-job exposure of national partners from 3 states in India (Gujarat, Haryana, and Rajasthan) at ICRISAT-India as part of our research collaboration.

			• Air conditioners purchased for incubation rooms, to be established with pearl millet breeding programs in each participating Indian state.
	Targeted Outcomes	**Baseline**	**Progress (Y1)**
	Short term • Breeding programs performing highly efficient conventional greenhouse downy mildew screening **Long term** • Danger of large-scale downy mildew epidemics reduced through cultivation of resistant cultivars		Too early to show outcomes – Outputs expected in Y3 in WCA and Y2 in SA.
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**
Activity 3.5. Identify and/or develop pearl millet breeding lines and hybrid parents for target ecologies	**SA** • New breeding lines with both downy mildew resistance and drought adaptation in good agronomic backgrounds developed (Y3, Y4) • New hybrid parents identified with good grain appearance, superior grain and stover yield, drought adaptation, and downy mildew resistance (Y3) • First cycle downy mildew resistance improvement of two elite hybrid parents (J 2340 and ICMR 01004) by marker-assisted backcrossing completed (Y2, Y3) • Second cycle downy mildew resistance improvement of elite pollinator J 2340 completed, pyramiding resistances by marker-assisted selection (Y3)		**SA** • Seed of pearl millet breeding lines (216, 225) produced and distributed to partners for multi-location evaluation in the target environments of Gujarat, Haryana and Rajasthan. • 32 of 144 early-flowering B-lines and 18 progenies from the ICRISAT-CAZRI B composite have been selected for conversion to cytoplasmic-male sterile A-lines and crosses made to initiate conversion of the latter 18 in-breds. • 74 potential B- and R-lines have been evaluated for flowering time and agronomic score on-station at 4 sites distributed across the target region. • Parental lines involved in development of test-crosses have been screened under greenhouse conditions at ICRISAT-India against downy

			mildew (DM) isolates. • Integrated marker-assisted and conventional backcrossing to improve DM resistance of elite pollinator lines using a total of 6 previously mapped DM resistance sources have been advanced two generations during Y1.
	Targeted Outcomes	**Baseline**	**Progress (Y1)**
	Short term • Improved breeding lines with biotic stress resistance and/or abiotic stress tolerance used by breeders • Wider range of diverse, adapted hybrid parents available and being used by breeders • Versions of elite hybrid parents with improved disease resistance used by breeders • Private sector in India invests more in hybrid development for rainfed conditions in northwestern India **Long term** • Sustainable genetic gains (level of heterosis) from pearl millet hybrid breeding • High-yielding hybrids with more stable biotic stress resistance and abiotic stress tolerance • Yield increases in farmer fields due to cultivation of stable pearl millet hybrids		Process ongoing. Results expected from Y2.
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**
Activity 3.6. Develop pearl millet hybrids with improved yielding ability and necessary adaptation and market-required traits for specific target regions	**SA** • 60 hybrids developed for multi-location testing in northwestern India (Y2, Y3, Y4) • 3 hybrids selected for seed increase and future inclusion in state and national trials in northwestern India (Y3, Y4)		**SA** • 188 new testcross hybrids have been evaluated. • 47 hybrids have been identified for further evaluation based on their superior qualities.
	Targeted Outcomes	**Baseline**	**Progress (Y1)**

	Short term • Increased availability and cultivation of elite pearl millet hybrids for areas where hybrid development has been neglected • 6 well-adapted hybrids available for participatory evaluation in 3 states in northwestern India **Long term** • Increased pearl millet production and yield stability in the target regions		40 of the 47 selected testcross hybrids appear promising.
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**
Activity 3.7. Create diversified populations, perform recurrent population improvement for priority traits, and generate new pearl millet OPVs adapted to specific target environments	**WCA** • At least two new, farmer-preferred downy-mildew resistant experimental cultivars derived from recurrent population improvement developed per country for large-scale on-farm testing (Y4) • At least two new breeding populations based on farmer-preferred, trait- or adaptation-specific pearl millet germplasm groups for WCA developed per participating country (Y4)		**<u>WCA</u>** • FS families have been produced at ICRISAT-Niger and distributed for a final cycle of FS selection towards creating new experimental open-pollinated varieties based on seven populations.
	Targeted Outcomes	**Baseline**	**Progress (Y1)**
	Short term • Breeders use new trait-specific, adapted germplasm • Improved populations used for experimental open-pollinated variety development • Improved experimental open-pollinated varieties used for participatory evaluation **Long term** • Broad genetic base being used for sustainable pearl millet improvement in specific WCA		Too early to show outcomes.

	ecologies • More effective collaboration among breeders in neighboring countries with similar agro-ecologies • Increased pearl millet productivity and improved yield stability		
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**
Activity 3.8. Evaluate the potential of newly developed pearl millet varieties and hybrids, and crop management practices, using large-scale, gender-specific, farmer-participatory multi-location testing approaches	**WCA** • Pearl millet varieties and their on-farm response to management options characterized in participatory trials (Y2, Y3, Y4) • At least one pearl millet variety identified by farmers for larger-scale dissemination in each target area (Y3, Y4) • 200 farmers participate in Farmers Field Schools (FFS) on integrated *Striga* and soil fertility/water management (ISSFM/ISFW) methods in one target area each in Mali and Niger (Y2, Y3) • Lessons learned and best practices for effective large-scale participatory trial management published jointly with sorghum (Y4) **SA** • Pearl millet hybrids and their on-farm response to management options characterized on-farm (Y2, Y3, Y4) • Two farmer-preferred hybrids and a management option identified by farmers for larger-scale dissemination in each target area (Y3, Y4) • Lessons learned and best practices for effective large-scale participatory trial management published (Y4)		**WCA** • Farmers and field agents trained and Farmer Field Schools established. • Diagnostic interviews performed. **SA** • 19 pipeline hybrids (16 from project partners and 3 from private seed companies) undergoing evaluation.

	Targeted Outcomes	Baseline	Progress (Y1)
	Short term • Increased availability and cultivation of elite cultivars • New pearl millet cultivars available for dissemination by private- and public-sector partners • 30% of farmers in target sites are using new varieties and/or crop management practices • Average yield and/or income increase of 40% among early adopters of integrated cropping techniques **Long term** • Production increase and stability, and improved micronutrient nutrition • Institutionalization of farmer-participatory varietal and crop management testing and increased effectiveness of breeding programs • Sustainable and profitable increases in dryland pearl millet production • National breeding programs more effectively target farmer-preferred traits • Reduction in the damaging effect of *Striga*, low soil fertility and drought on millet crop		Process ongoing.
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**
Activity 3.9. Strengthen research-for-development capacity	**WCA** • At least 6 partner organizations (2 per country) trained in farmer-participatory trial implementation (Y1) • NARS partners trained in IGNRM, downy mildew screening techniques, statistical analysis and recurrent selection methods (Y3)		**<u>WCA</u>** • Training courses were conducted for 15 field agents and 70 lead farmers in participatory research and statistical analysis of genotype × environment interactions.

	SA • Short course in application of molecular markers in pearl millet improvement (Y1) • Short course in greenhouse screening for resistance to downy mildew (Y1) • At least 6 partner organizations (2 per state) trained in farmer-participatory trial implementation (Y1)		• **SA** • 3 Indian pearl millet national program scientists (including 1 woman) participated in a 3-week training course on application of molecular marker-based tools for crop improvement. • 1 ICRISAT-Niger research assistant and 4 Indian national program staff trained in India (4 weeks) in the screening of potted pearl millet seedlings against downy mildew.
	Targeted Outcomes	**Baseline**	**Progress (Y1)**
	Short term • R&D partners have capacity to conduct participatory trials on a large scale • Breeding programs performing highly efficient conventional greenhouse downy mildew screening • Hybrid breeding programs initiating applied use of marker-assisted selection • Application of appropriate and efficient tools in market-oriented pearl millet breeding • National pearl millet breeding programs strengthened in WCA and SA **Long term** • Institutionalization of farmer-participatory varietal testing and increased effectiveness of breeding programs		• 15 field agents in Niger and 70 lead farmers now have the capacity to conduct large scale participatory trials. • 4 national partners in India trained in screening techniques.

OBJECTIVE 4

<table>
<tr><td>Vision of Success:</td><td colspan="3">During the first phase, the HOPE Project will improve the productivity of sorghum, pearl millet and finger millet by 35-40% through introduction of improved technologies and market innovations that increase adoption and profitability to 110,000 households in sub-Saharan Africa (SSA) and 90,000 in South Asia (SA). Within ten years the project will benefit 1.1 million households in SSA and 1.0 million in SA.</td></tr>
<tr><td>Project Objective 4:</td><td colspan="3">Improve Finger millet cultivars and management options to increase productivity in ESA</td></tr>
<tr><td>Activities</td><td>Targeted Outputs</td><td>Baseline</td><td>Progress (Y1)</td></tr>
<tr><td rowspan="2">Activity 4.1. Enhance finger millet genetic resource base and use it to identify new sources of resistance to key biotic stresses</td><td>ESA
Reference collection of finger millet assembled and evaluated by Y2
The finger millet core collection at ICRISAT augmented for improving chances of identifying useful materials by Y2
150-200 finger millet germplasm accessions characterized and genetic diversity information enhanced using molecular technology by Y4
Stable sources of blast resistance identified by Y3
Eight new sources of Striga resistance identified by Y4</td><td></td><td>The millet core collection was characterized and a subset of 144 lines that expressed variability in morphological traits and blast reaction was composed and planted at Alupe, Kenya. Agronomic traits: days to flowering, days to heading, plant height, number of tillers, panicle size and shape and reaction to different biotic stresses were recorded.</td></tr>
<tr><td>Targeted Outcomes</td><td>Baseline</td><td>Progress (Y1)</td></tr>
<tr><td>Short-term
Breeders using a characterized and broadened finger millet genetic resource base conduct more efficient and effective crop improvement programs
Pathologist understand and access new sources of resistance and use these in selection for blast resistance</td><td></td><td>Database from Kenya, Uganda, Ethiopia and Tanzania acquired.
150-200 millet accessions evaluated.
Unique accessions available for screening.
Germplasm collected from Tanzania and Uganda.
45 to 60 available blast resistant sources evaluated for a season at hot-spot sites.
Striga endemic areas identified.</td></tr>
</table>

	Long term • Partners increased access to finger millet germplasm that is thoroughly characterized for use in crop improvement programs • Synergies can be exploited with rice genomics work especially in the understanding of blast resistance • Current and future generations that utilize the finger millet biodiversity can sustain their improvement programs and livelihoods		
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**
Activity 4.2. Identify sources of resistance to the key abiotic stresses, adaptation and quality traits	**ESA** • Eighty finger millet varieties identified for drought resistant and desired head and grain characteristics by Y3 • Initial identification of 40-50 superior germplasm sources for direct use or for incorporation in the breeding activities by Y4 • Twenty five superior germplasm sources identified for direct use or for incorporation in the breeding activities by Y4 • 20-25 finger millet lines identified that have expressed good levels of resistance to drought and are also resistant to *Striga* and blast by Y4 • Agronomic, head, grain and end use characteristics determined for 45 -50 lines selected based on their biotic stress resistance and abiotic stress tolerance by Y4		No Activity was scheduled for Y1.

	Targeted Outcomes	Baseline	Progress (Y1)
	Short term • Breeders access broader sources of drought resistance, adaptation and quality traits • Breeders using diverse sources of disease resistance, stress tolerance, and grain micronutrient density are able to develop better adapted varieties with more stable performance • Additional opportunities for mapping blast resistance, drought tolerance and grain micronutrient density identified **Long term** • End users, especially women and children, accessing micronutrient-dense products will have improved nutrition and health		• Unique accessions available for possible identification of key abiotic stress, adaptation and quality traits. • Crosses have been made which are likely to segregate for desired traits.
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**
Activity 4.3. Develop breeding and mapping populations for improving finger millet resistance to blast, drought and adaptation to different agro-ecologies	**ESA** • Efficient finger millet emasculation techniques developed for use in hybridization activities by Y2 • Segregating populations developed for sharing with two targeted NARS (who were in offseason) for further selection by Y2 • F2 advanced to produce F3 seeds using SSD and pooled to generate the F2 derived F3 generation (F2:3) and F4 by Y3 • Breeding populations and lines developed based on crosses between blast, drought and *Striga* resistant lines with farmer preferred and adaptable varieties by Y3		• Varieties with contrasting morpho-agronomic traits (plant height, head compactness, seed color, plant color, days to maturity) were identified and 11 cross combinations were made using two emasculation techniques. • Contrasting varieties for blast resistance were crossed to initiate blast mapping populations at Kiboko, Kenya.

	• Mapping populations development using parental lines identified with diverse reaction to blast (a blast resistant and a susceptible source) initiated by Y3		
	Targeted Outcomes	**Baseline**	**Progress (Y1)**
	Short term • Breeders are able to use drought tolerance and blast resistance QTL for introgression and developing improved varieties **Long term** • Breeders are able to integrate conventional and molecular tools in developing adaptable varieties		• Six highly diverse finger millet varieties identified. • Crosses made from highly diverse varieties. • 12-15 F1 populations planted and F1s determined. • Blast resistant and tolerant lines identified. • 10 crosses made. • One pair of blast resistant contrasting parents identified. • Blast mapping population initiated.
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**
Activity 4.4. Identify and develop varieties with improved yielding ability, resistant to key biotic and abiotic stresses for the targeted agro ecologies and end uses	**ESA** • Superior lines that combine blast resistance, adaptation, preferred grain yield and high levels of micronutrients identified to feed into on station Multi Environment Trials (MET) and Participatory Variety Selection (PVS) by Y2 • Superior lines developed from farmer preferred local varieties (identified for each country) using mass selection supplemented with purity procedures by Y4 • 50 improved blast resistant and drought tolerant lines selected from the developed breeding populations available for preliminary yield evaluations by Y4		• 40 farmers in each target region of Uganda, Kenya, Tanzania and Ethiopia consulted in a group discussion. • Participatory Varietal Selection (PVS) trials were established in different countries using released or about to be released varieties.

	Targeted Outcomes	Baseline	Progress (Y1)
	Short term • Breeders are able to sustainably develop materials that combine a number of traits • Improved varieties that can be accessed by breeders for further evaluation **Long term** • Farmers are able to adopt and grow improved varieties that have quality attributes required by industry		• 41 scientists, extension staff and farmers in Tanzania trained to train extension staff and farmers on procedures of selecting and adapting improved varieties.
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**
Activity 4.5. Determine adaptability and yield stability of improved varieties for the targeted agro-ecologies and end uses	**ESA** • Sites for multi-location testing identified and described and materials contributed by partners multiplied by Y1 • Twenty five (25) high yielding varieties tested in regional multi-environment trials (MET) in representative sites of the targeted agro-ecologies of the 4 ESA target countries and data shared by Y4 • MET data collated for joint analysis and interpretation by breeders trained on MET data analysis under the capacity building activity 4.8 milestone 2 by Y4 • Grain quality characteristics and nutritional attributes of 5 varieties determined and documented by Y4		• Test sites identified in Ethiopia, Uganda, Kenya and Tanzania and their biophysical characteristics gathered for collation. • Sites mapped over agro ecologies. • 1-4 best performing varieties from each NARS available for MET trials. • Two predominant production agro ecologies identified.
	Targeted Outcomes	**Baseline**	**Progress (Y1)**
	Short term • Breeders participating in MET are able to identify most stable and adaptable varieties for release **Long Term**		• Twenty five (25) high yielding varieties tested in Kenya, Tanzania and Ethiopia.

	• Breeders can plan and implement breeding programs more efficiently • Farmers and seed delivery systems gain access to improved FM cultivars having combined blast resistance and drought tolerance, reducing the major production risks for this crop • Farmers accessing the most stable and adaptable varieties will experience increased productivity		
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**
Activity 4.6. Develop and assess crop management options for key constraints in the targeted finger millet production ecologies to enhance productivity	**ESA** • Herbicide-based weed management (pre- and post-emergence) options tested for cost efficiency and weed control effectiveness by Y4 • Options for integrated *Striga* and weed management availed by Y4 • Different rates of fertilizer (macro nutrients) tested in each country to determine the most feasible and economic rates by Y4		• Information on type and density of weeds and current practices for weed control collated, analysed and opportunities for improved management practices identified. • Three integrated herbicide practices identified. • Experimental protocols on *Striga* management developed. • Major soil limitations for finger millet production in target countries identified.
	Targeted Outcomes	**Baseline**	**Progress (Y1)**
	Short term • Researchers are able to determine the best bet management options to advance into farmer participatory validation of integrated technologies **Long term** • Researchers increase confidence on crop management technologies that are cost effective for farmers • Improved profitability and reduced drudgery		• Herbicide weed control trial under evaluation in Ethiopia.

	of finger millet production • Least laborious and most profitable intercropping systems and other finger millet crop, soil and water management practices adopted by farmers		
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**
Activity 4.7. Participatory validation of integrated improved varieties with crop and fertility management options to enhance productivity	**ESA** • Effectiveness and economics of integrated variety, fertilizer and weed management options validated with 120 farmers (40% of whom are women) in Ethiopia, Kenya, Uganda and Tanzania by Y3 • Variety Release Regulatory compliant information compiled and 4 varieties one each for Kenya, Ethiopia, Tanzania and Uganda become ready for moving into the release systems through the country's regulatory system by Y4		• A protocol for evaluation of the four varieties across countries is being developed.
	Targeted Outcomes	**Baseline**	**Progress (Y1)**
	Short term • Farmers will have a wide range of weed management options for their specific agro ecologies • Farmers preferred varieties identified for proposing into the release system **Long term** • Researchers increase confidence on crop management technologies that are cost effective for farmers adoption • Farmers experience on participatory approaches and technology integration that enhance dissemination and uptake • Institutionalized use of farmer-participatory		Nil so far.

	methods to complement conventional on-station evaluation of improved varieties and crop management practices		
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**
Activity 4.8. Capacity building, knowledge and information sharing for pursuance of finger millet crop improvement and management	**ESA** • Short term training provided to 35 NARS partners and information sharing materials developed and shared with partners in Ethiopia, Kenya, Tanzania and Uganda by Y4 • Two MSc students advised on plant breeding and pathology covering conventional and molecular technology and one project supported student on crop management and crop intensification by Y4		• 15 Scientists from ICRISAT and NARS (Uganda, Kenya, Tanzania and Ethiopia), trained in Multi-locational Experimental Trial (MET) data analysis.
	Targeted Outcomes	**Baseline**	**Progress (Y1)**
	Short term • Partners with enhanced capacity are better able to develop tools and products that address the key finger millet biotic and abiotic stresses • Partners with analytical skills are more capable in making inferences from scientific data • End users and policy makers reached with well packaged information better understand the nutrition and health benefits from finger millet utilization **Long term** • Partners with enhanced capacity and analytical skills are able to use available tools and methods in developing improved and adaptable varieties		• Participants of the MET training course used skills to design trials for Participatory Variety Selection (PVS) and integrated weed management.

	• Informed end users attain improved health and nutrition and policy makers give finger millet a high profile in national agricultural strategic plans • Improved finger millet global profile for food security, income and nutrition		

OBJECTIVE 5

Vision of Success:	During the first phase, the HOPE Project will improve the productivity of sorghum, pearl millet and finger millet by 35-40% through introduction of improved technologies and market innovations that increase adoption and profitability to 110,000 households in sub-Saharan Africa (SSA) and 90,000 in South Asia (SA). Within ten years the project will benefit 1.1 million households in SSA and 1.0 million in SA.		
Project Objective 5:	**Discover and develop strategies for improving markets for sorghum, pearl millet, and finger millet to stimulate adoption of improved technologies by smallholder farmers in WCA, ESA, and SA**		
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**
Activity 5.1: Map marketing channels and measure transaction costs for selected value chains (food, feed, fodder) including competing crops (maize)	**WCA:** • Market and value chain surveys conducted for sorghum (Nigeria and Mali) and pearl millet (Niger) (Y2) • Marketing channels for pearl millet and sorghum defined and value chains mapped (Nigeria and Mali) and pearl millet (Niger) (Y3) • Transaction costs and distribution of marketing margins estimated for selected value chains for sorghum (Nigeria, Mali) and pearl millet (Niger) (Y4) **ESA** • Market and value chain surveys conducted for sorghum and finger millet in Tanzania (link to Nairobi market in Kenya) and Ethiopia (Y2) • Marketing channels for finger millet and sorghum defined and value chains mapped in Ethiopia and Tanzania (Y3) • Transaction costs and distribution of marketing margins estimated for selected value chains in Ethiopia and Tanzania (Y4) **SA** • Grain and fodder market and value chain surveys		**WCA** • Markets to be surveyed have been identified in collaboration with the "Observatoire des Marches Agricoles" (OMA) du Mali and the "Système d'Information sur les Marchés Agricoles" (SIMA) of Niger. Contacts have been made with NAERLS in Nigeria and market information systems in Burkina Faso. • Participatory market chain analysis methodology has been developed and discussed with NARS economists and relevant stakeholders. Value chain actors, stakeholders in the institutional and policy environment and providers of business services will be identified in Niger and Mali in order to map the markets. **ESA** • Survey instruments for marketing channels are being designed to complement market surveys and value chain analysis conducted in target countries during 2010 by the East African Grain Council (EAGC).

	conducted for sorghum (Maharashtra), pearl millet (Gujarat and Rajasthan) (Y2) • Marketing channels for sorghum (Maharashtra) and pearl millet (Gujarat and Rajasthan) (grain and fodder) defined and value chains mapped (Y3) • Transaction costs and distribution of marketing margins estimated for selected value chains for sorghum (Maharashtra) and pearl millet (Gujarat and Rajasthan) (grain and fodder) (Y4)		**SA** • Survey instruments have been developed to elicit information from traders, commission agents, processors and retailers of sorghum and distributed to partners to conduct market surveys. • Grain and fodder markets (informal) in target regions identified for post-rainy season sorghum and pearl millet through information on supply and prices and through fact finding visits. • Field investigators trained in market surveys and surveys initiated. • Long term data for supply and prices of post-rainy season sorghum in major markets of Maharashtra collected and analyzed. • Data for prevailing marketing costs and marketed surplus for post rainy have been estimated.
	Targeted Outcomes	**Baseline**	**Progress (Y1)**
	Short term • Project scientists, traders and other key stakeholders use the databases to inform their work • Market opportunities along the value chain identified and used by project partners to increase market access for farmers **Long term** • Better market linkages to enhance the structure and performance of markets for dryland cereals • Better policies and institutional capacity to improve markets		• Database formulation in progress. • Market identification and study on-going.
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**

Activity 5.2: Establish existing seasonal demand, quality characteristics, prices and relative competitiveness of sorghum and millets in alternative uses (food, feed, fodder)	**WCA** • Potential demand for use of sorghum (Burkina Faso, Nigeria, Mali) and pearl millet (Niger, Mali) in the food processing and feed (poultry) industries estimated (Y2) • Product characteristics, quality requirements and price premiums for different end-users identified for sorghum (Burkina Faso, Nigeria, Mali) and pearl millet (Niger, Mali) (Y3) **ESA** • Demand for food processing industries for finger millet estimated in Kenya, Uganda, Ethiopia and Tanzania (Y2) • Potential demand for use of sorghum as food and feed and its competitiveness estimated in Ethiopia and Tanzania (Y3) • Product characteristics, quality requirements and price premiums for different end-users identified (Y3) • Options to improve consistency of supply in meeting end-user needs for quality and quantity identified (Y4) **SA** • Potential demand for food and other uses of grain sorghum (Maharashtra), pearl millet (Gujarat and Raja) estimated (Y2) • Potential demand for fodder from sorghum (Maharashtra), and pearl millet (Gujarat, Rajasthan) estimated (Y2) • Product characteristics, quality requirements and price premiums for different end-users for grain and fodder for sorghum (Maharashtra) and pearl millet (Gujarat and Rajasthan) identified (Y3)		**WCA** • A review of literature has been carried out on the use of sorghum and pearl millet in the poultry sector and processing industries in Niger and Mali. Standardized survey instruments have been developed. • Contacts have been initiated with the Food Technology Laboratory (LTA-IER) of the Institut d'Economie Rurale (IER) in Mali and the Food Technology Laboratory of Niger (LTA) to finalize a roster of sorghum and/or millet small-scale processors. A roster of processors was made available from which we will draw a sub-set to interview. A roster of poultry growers will be developed using the snowball identification procedure. This will enable us to assess the potential demand for sorghum and/or pearl millet for food and feed in those countries. **ESA** • Survey instruments are being designed for interviewing major processors and identifying demand. **SA** • Sorghum and pearl millet consumption, seed, export and alternate use demand estimated at the national level in India using data from the National Survey Sample Organization (NSSO). • Secondary information on alternate uses is not readily available; therefore surveys (meeting traders, processors and hotels for consumption demand) are in progress to estimate potential demand of pearl millet for other sectors.

	• Options to improve consistency of supply in meeting end-user needs for quality and quantity of grain and fodder of for sorghum (Maharashtra) and pearl millet (Gujarat and Rajasthan) identified (Y4)		
	Targeted Outcomes	**Baseline**	**Progress (Y1)**
	Short term • Farmers informed about available markets and product characteristics begin to supply desired products • Feed processors realize the viability of sorghum and begin to formulate sorghum-based rations • Seed companies disseminate seeds from existing varieties that meet end-user choices **Long term** • Breeders will develop market preferred varieties to meet the needs of different end-users		Nil so far.
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**
Activity 5.3: Identify consumer preferences, perceptions and price - and non-price factors that determine the demand for sorghum and millet in human diets	**WCA** • Consumer surveys in selected markets for pearl millet (Niger and Mali) and sorghum (Nigeria and Mali) conducted (Y2) • Drivers of consumer demand for sorghum (Nigeria and Mali) and pearl millet (Niger and Mali) as food identified (Y4) • Policy brief developed on strategies for improving consumer demand for sorghum and pearl millet as human foods in WCA and shared with partners (Y4) **ESA**		**<u>WCA</u>** • Consultations with the National Directorate of Statistics in Mali and Niger have been established. Discussions have taken place on the sampling scheme used by these institutions to conduct consumption-expenditure surveys. The sample scheme is based on income groups, even in the urban areas, and rural versus urban groups. Standard questionnaires have been developed and shared with experts in those institutions.

	• Consumer surveys in selected markets for finger millet (Kenya) and sorghum (Tanzania and Ethiopia) conducted (Y2) • Strategies for improving consumer demand for sorghum (Ethiopia, Tanzania) and finger millets (Kenya) as human foods developed and shared with partners (and Objective 6) for implementation (Y4) **SA** • Factors that influence consumption of sorghum (Maharashtra) and pearl millet (Gujarat and Rajasthan) for food identified and documented (Y3) • Strategies for improving consumer demand for sorghum and pearl millet as human food developed (Y4)		**ESA** • To start following completion of Activity 5.1. **SA** • Survey instruments developed and made available for conducting consumer surveys. • Sample design and sample locations finalized for consumer surveys in consultation with partners. • Consumer surveys are in progress in western Maharashtra and will commence by the end of June for the Marathwada region.
	Targeted Outcomes	**Baseline**	**Progress (Y1)**
	Short term • Scientists and project partners informed about factors that limit consumption of sorghum and millet as food • Partners promote available varieties and products that meet consumer preferences **Long term** • Breeders develop varieties that meet consumer preferences for taste, color, nutrition, etc • Market actors and processors take steps to develop new products that meet consumer choice		Based on information from secondary level data analysis, scientists and partners have been informed about the current consumption pattern of sorghum / pearl millet for food and alternative uses.
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**

Activity 5.4: Evaluate and identify effective grain and fodder marketing strategies for reducing transaction costs and develop strategies for introducing grades and standards	**WCA** • Develop or strengthen farmers associations/ organizations at collective marketing (e.g., agro-dealers and producer marketing groups) for pearl millet (Mali, Niger) and sorghum (Mali, Nigeria) (Y2) [linked to WASA] • Grain collection points established, tested and evaluated for sorghum (Mali) and pearl millet (Mali and Niger) (Y3) • Warrantage system (Warehouse receipt system) tested for sorghum (Mali) and pearl millet (Niger) – Linked with FAO Project INTRANTS (Y4) • Grades and standards associated to corresponding price premium for sorghum (Mali) and pearl millet (Mali and Niger) identified (Y4) **ESA** • Good business practices and price premiums needed for grades and standards established and documented (across countries) (Y2) • Marketing through farmer organizations (e.g., agro-dealers and producer marketing groups) tested for sorghum (Ethiopia, Tanzania) and finger millet (Kenya, Ethiopia, Tanzania) (Y2) • Grain collection centers tested and evaluated for sorghum (Ethiopia, Tanzania) and finger millet (Ethiopia, Tanzania) (link with Purchase for Progress, P4P of WFP) (Y3) • Warehouse receipt systems tested for sorghum marketing (Ethiopia, Tanzania) (link with Purchase for Progress, P4P of WFP) (Y4)		**WCA** • Five PMGs have been identified by AOPP and five other PMGs have been chosen by Mooriben in Niger. Linkage with the USAID-funded WASA has been established to train the management committees of the associations in small-scale business skills. **ESA** • Y2 activity which will start in September 2010.

	SA • Marketing of grain through farmer organizations (e.g., agro-dealers and producer marketing groups) linked with supermarkets, processors and wholesalers tested in India for sorghum (Maharashtra) and pearl millet (Gujarat, and Rajasthan) (Y3) • Marketing of fodder through farmer organizations linked with feed processors and wholesalers tested in India for sorghum (Maharashtra) and pearl millet (Gujarat and Rajasthan) (Y4)		**SA** • Some wholesalers / bulk buyers identified. • Farmers associations are being formed in the target cluster under Objective 6. • Some processors of fodder identified through reconnaissance surveys.
	Targeted Outcomes	**Baseline**	**Progress (Y1)**
	Short term • Farmers adopt more profitable marketing channels and receive higher prices for their produce • Farmers increase participation in sorghum and millet markets as sellers • Farmers increase marketed surplus and adopt good business practices **Long term** • Farmers become more reliable business partners in the value chain • Increased demand and commercialization of sorghum and millet production		Nil so far.
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**
Activity 5.5: Develop appropriate models for farmer-market linkages using alternative formal and informal arrangements with buyers to improve market access	**WCA** • Alternative options (radio, mobile phones, other existing market information systems) for delivering timely and relevant market information to farmers identified for sorghum (Nigeria, Mali) and pearl millet (Niger and Mali) (Y2) • Formal and informal contractual arrangements		**WCA** • Rural radios have been identified in Niger and Mali. Discussions held with head, market information systems, and it appears that market information is being supplied to farmers. However, the frequency is limited to weekly. Discussions are ongoing to increase the

	between producers and food/feed processors tested and best practices identified for sorghum (Mali) and pearl millet (Niger) (Y4) **ESA** • Alternative options (radio, mobile phones, internet, etc) for delivering timely and relevant market information to farmers tested and identified for sorghum (Ethiopia, Tanzania) and finger millet (Kenya, Tanzania) (Y2) • Effective models for linking producers with food processing industry identified for finger millet (Kenya, Tanzania) (Y3) • Formal and informal contracting methods with food and feed processing industry tested and best practices identified for sorghum (Tanzania, Ethiopia) (Y4) **SA** • Alternative options (radio, mobile phones, internet, etc) for delivering timely and relevant market information to farmers tested and identified for sorghum (Maharashtra) and pearl millet (Gujarat and Rajasthan) (Y2) • Effective models for linking producers with food /feed processing industry for grain and fodder developed for sorghum (Maharashtra) and pearl millet (Gujarat, and Rajasthan) (Y4)		frequency of information. • Efforts focused on testing the efficiency of supplying information through cell phones as compared to rural radio. **ESA** • Activity planned for January 2011. **SA** • Existing channels of market information dissemination documented. • Partners making use of the sources (radio, TV and newspaper) to disseminate information. • Special programmes on market information for target crops will be provided.
	Targeted Outcomes	**Baseline**	**Progress (Y1)**
	Short term • Farmers benefit from market linkages and access to services • Processors and other buyers informed about available supplies and product characteristics		Nil so far.

	Long term • Farmers reduce transaction costs and benefit from higher and reliable prices • Increased trust and relationship between farmers and buyers that would strengthen value chains • Higher market demand for dryland cereals		
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**
Activity 5.6: Determine opportunities for small-to-medium scale agro-enterprise development, local processing and value addition to stimulate markets and expand consumption demand	**WCA** • Agribusiness opportunities for sorghum (Mali, Nigeria) and pearl millet (Mali, Niger) in processing, transport, storage, wholesale and retailing activities identified and models developed through consultation and meetings with value chain actors (Y2) • Labor-saving and low-cost options for household processing and utilization of sorghum (Mali) and pearl millet (Niger) by targeting women tested (Y3) • Agro-enterprise opportunities in production and marketing of foundation and certified seed identified and models developed for sorghum (Mali, Nigeria) and pearl millet (Niger, Mali) (Y3) • Equip and enhance the capacity of food processing unit in Niger at supplying good quality sorghum and pearl millet processed products in the market (linked to the private sector) (Y4) **ESA** • Agribusiness opportunities for sorghum (Ethiopia, Tanzania) and finger millet (Tanzania, Kenya, Uganda) in processing, transport, storage, wholesale and retailing activities identified and models developed through discussions with		**WCA** Work on this activity commences in Y2. **ESA** • This activity starts in Y2.

	stakeholders (Y3) • Agro-enterprise opportunities in production and marketing of foundation and certified seed identified and models developed (Y3) • Labor-saving and low-cost options for household processing and utilization of sorghum and finger millets tested (Y4) **SA** • Low cost option for household processing and utilization of sorghum (Maharashtra) and pearl millet (Gujarat) grain tested (Y3) • Low cost option for household level processing of and utilization of sorghum (Maharashtra) and pearl millet (Gujarat) fodder tested (Y4)		**SA** • Some low-cost equipment (grain cleaners and sorters) identified for sorghum processing. • Low-cost fodder chopper for sorghum and pearl millet identified.
	Targeted Outcomes	**Baseline**	**Progress (Y1)**
	Short term • More sustainable seed production and marketing systems • Decrease in labor costs and drudgery of grain/food processing for women • Increased income generation opportunities for men and women **Long term** • Increased availability of seed and higher adoption of new varieties • Farmers diversify income sources and earn additional income • New food products that increase consumer demand for dryland cereals • Commercial production of sorghum and millets expands as new enterprises are established		• The draft gender plans for WCA and ESA propose that labor-saving and low-cost processing options be identified and tested in Year 2 to allow for impact evaluation on women's workload in Year 4.

Activities	Targeted Outputs	Baseline	Progress (Y1)
Activity 5.7: Strengthen local capacity for value chain and policy analysis and market projection	**WCA** • Conduct regional short-term training courses or research workshop for partners in the following areas: – Value chain analyses methods (Y2) – Strategies for linking farmers with buyers (Y2) – Agribusiness skills and enterprise opportunities in sorghum and finger millets (Y2) • Support 2 MSc students from the target countries in the region for their research on improving markets for sorghum (1 student) and pearl millet (1 student) (Y4) • Policy briefs on improving market linkages and manual for processing and agribusiness development for women (Y4) **ESA** • Three (3) MSc students from the target countries in the region identified and supported for their research on improving markets for sorghum and finger millet (Y1) • Regional short-term training courses or research workshop for partners conducted in the following areas: – Value chain analyses methods (Y4) – Strategies for linking farmers with buyers (Y4) – Agribusiness skills and enterprise		**<u>WCA</u>** • Training modules have been drafted but not finalized. Training will take place in November 2010. • One student registered at the Universite Abdou Moumouni of Niamey has been identified and will focus his thesis on "Competitiveness between sorghum and pearl millet relative to other cereals in Niamey, Niger". The student in Mali is yet to be identified. **<u>ESA</u>** • Two students have been identified in Tanzania. One for Ethiopia will be selected by Sept 2010.

	opportunities in sorghum and finger millets (Y4) • Three master thesis completed by MSc students and seminars presented for project partners (Y4) • Policy briefs on improving markets and toolkits for processing and agribusiness development, especially for women (Y4) **SA** • Support 2 MSc students from India for their research on improving markets for sorghum (1 student) and pearl millet (1 student) (Y1) • Regional short-term training courses prepared and research workshops conducted for partners in the following areas: – Value chain analyses methods (Y4) – Strategies for linking farmers with buyers and improving agri-business skills (Y4) • Policy briefs on improving markets and toolkits for processing, especially for women (Y4)		**SA** • Students and research topics identified (One M.Sc. student to work on fodder marketing of post-rainy season sorghum and one Ph.D. student on consumption and marketing of pearl millet) • Training of partners and investigators on consumer and market surveys being carried out to meet the project milestones.
	Targeted Outcomes	**Baseline**	**Progress (Y1)**
	Short term • Increased number of qualified researchers addressing market constraints for these orphan crops • NARS and private sector partners enhanced to analyze markets and propose policy options for dryland cereals • Improved availability of information on processing options and enterprise opportunities for women and farmer groups		Training of NARS and private sector partners on-going.

	Long term • Countries build critical mass of market analysts to support market development • Better linkages between farmers and other value chain actors • Farmers have sustained access to markets, information and processing technology		

OBJECTIVE 6

Vision of Success:	During the first phase, the HOPE Project will improve the productivity of sorghum, pearl millet and finger millet by 35-40% through introduction of improved technologies and market innovations that increase adoption and profitability to 110,000 households in sub-Saharan Africa (SSA) and 90,000 in South Asia (SA). Within ten years the project will benefit 1.1 million households in SSA and 1.0 million in SA.		
Project Objective 6:	**Enable technology adoption of sorghum, pearl millet, and finger millet by improving access to seeds, markets, inputs, know-how and finance in ESA, WCA, and SA**		
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**
Activity 6.1: Increase farmers' access and use of knowhow about the use and benefits of profitable crop management technologies and improved cultivars	**WCA** • Training manuals in two languages on integrated *Striga* management for pearl millet based systems in the Sahelian zone of Mali and Nigeria published and distributed (Y2) • Radio programs in two languages on variety characteristics, crop management options and market information broadcast (Y4) **ESA** • Training manuals in five languages on integrated *Striga* management and micro-dosing for sorghum based systems developed (Y2) • Training manuals in three languages on integrated blast and weed management for finger millet developed (Y2) • Awareness and knowhow of farmers on integrated *Striga* management and micro-dosing for sorghum increased through participatory on-farm demonstrations in three countries (Y4) • Awareness and knowhow of farmers on integrated blast and weed management for finger millet increased through participatory on-farm demonstrations in four countries (Y4)		**WCA** • The first draft of training manual on integrated *Striga* management for pearl millet based systems in the Sahelian zone of Mali and Niger was completed, reviewed and awaits publication. • Fourteen rural radio stations in 7 regions (4 regions of Mali namely Koutiala, Tominian, Dioila and Mandé; Sanmatenga province in Burkina Faso and Boucle du Mouhoun (Toma et Gassan, and Center-Nord in Niger) have been broadcasting 73 programs (days) on *Striga*, seed and variety issues in 5 different languages. **ESA** • English versions of training manuals on integrated *Striga* management and micro-dosing for sorghum; and integrated blast and weed management and micro-dosing for finger millet have been drafted, reviewed and are awaiting translation into 4 main languages (Oromiya, Amharic, Tigrinya and Swahili). **SA (Sorghum)**

	SA **Sorghum** • Three clusters of 5 target villages established in Parbhani and Rahuri regions (6 clusters total) and secondary diffusion areas identified (Y1) • Farmers' associations established in each cluster (Y2) • Outreach strategy developed to create awareness about improved varieties and profitable crop management technologies and market opportunities developed and communicated (Y2) **Pearl millet** • Two clusters of target villages (5 each) established in each of Rajasthan, Gujarat and Haryana • Farmer associations/self-help groups strengthened in each village cluster • Outreach strategy developed to create awareness about promoted hybrids and profitable crop management technologies developed and implemented		• Identification of primary and secondary diffusion villages completed in each of the 3 clusters in 2 target regions (Marathwada and western Maharashtra). • Outreach strategies have been developed to encourage participation in project activities. • Flyers on sorghum crop management and cultivation technology have been developed for each released variety. **SA (Pearl millet)** • Six clusters were surveyed in Rajasthan and Gujarat and 7 clusters in Haryana and for each state 2 village clusters have been identified for project activities. A total of 71 villages were identified as secondary diffusion areas for the three states.
	Targeted Outcomes	**Baseline**	**Progress (Y1)**
	Short-term • Increased grain productivity and improved quality • More farmers producing grain from improved cultivars • Fertilizer available and used appropriately • Seed treatments available and used appropriately • Farmers practicing integrated agronomic management including *Striga* and cropping systems • Effective linkages established with other organizations working to improve availability of inputs		Nil so far.

	• Soil and water management practices applied to farmers' fields • Farmers practicing integrated crop management techniques for *Striga*, insects and soil fertility constraints **Long-term** • Increased farmer income		
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**
Activity 6.2: Increase availability and use of quality seeds of improved varieties	**WCA** • 4,500 farmer variety kits with pearl millet in the Sahelian zone distributed by farmer associations, private sector or extension services groups in Niger, Mali and Nigeria (Y4) • 5,000 farmer variety kits with sorghum distributed by farmer associations, private sector extension services in Mali, Burkina Faso and Nigeria (Y4) • Seed production training manuals for open-pollinated varieties of pearl millet and sorghum published in English, French in Mali, Niger and Nigeria (Y4) • 10 farmer associations, and individual members trained in seed marketing and business skills (Y4) • Ten tons of certified and QDS millet and sorghum seed disseminated through farmer organizations and agro-dealers in Mali, Niger, Burkina Faso and Nigeria (Y4) • Profitability of seed sales and initial variety adoption of sorghum varieties as a result of commercialization of Farmer Variety Kits assessed (Y3) • Profitability of seed sales, and increase of demand for quality seed of improved pearl millet varieties		**<u>WCA</u>** • Pearl millet - 1.1 tons of 15 experimental pearl millet varieties were produced and more than 12,000 mini-packs distributed in Niger; 403 mini-packs of 3 varieties were distributed in Mali; 95 mini-packs of one variety in Nigeria; and, 1,750 mini-packs of 2 varieties in Burkina Faso. • Sorghum - 1.4 tons of certified seed of 28 varieties was produced, and 4,000 mini-packs distributed. In Mali, certified seed of 15 varieties and hybrids was provided and 2,181 mini-packs distributed. In Nigeria, 3,980 mini-packs and 44 large packs were distributed, while in Burkina Faso 3,830 sorghum mini-packs were distributed. • An existing training manual on seed production for pearl millet OPV's in the Sahelian zone and one for sorghum for Mali were adapted and reviewed by seed experts. • 62 persons (42 farmers including 10 women and 20 extension officers) from 4 different farmer organizations were trained using the manual. In Burkina Faso, 72 pilot farmers of

	as a result of commercialization of Farmer Variety Kits in Mali and Niger assessed (Y3) • Country reports on farmer-preferred varieties and new crop management options with potential for more wide-spread adoption published on-line, on a yearly basis (Y2, Y3 and Y4) **ESA** • Handbook for production of quality seed of improved finger-millet and sorghum varieties developed and distributed to seed companies, farmer associations and other interested parties (Y2) • Quality seed of improved finger millet varieties produced and distributed through agro dealers, NGOs ,extension services, farmer associations and cooperatives (Y4) • Quality seed of improved sorghum varieties produced and distributed through agro dealers, NGOs ,extension services, farmer associations and cooperatives (Y4) • Availability of seeds of improved finger millet and sorghum varieties increased (Y4) • Country reports on farmer-preferred varieties and seed dissemination experiences targeting policy makers completed (Y4) **SA** **Sorghum** • Breeder seed of promoted varieties produced to feed seed supply chain (Y2) • One warehouse for post-rainy season sorghum seed storage established in MAU region (Y2) • Progressive farmers and KVKs identified and trained in post-rainy season sorghum seed		three farmer unions were trained as trainers by INERA and a farmer organization in the cultural aspects of sorghum and millet cultivation and experimentation. **ESA** • Certification standards have been compiled together with regionally agreed standards for Eritrea, Ethiopia, Tanzania and Kenya. • More than 25 kg of breeder seed of each of the 12 improved finger millet varieties has been multiplied. • In Ethiopia, 0.5 ha each for Padet, Tadessa and Boneya has been planted as a source for foundation seed. • In Tanzania, 23,000 kg of Macia seed and 2,000 kg of KARI Mtama 1 are in the National Performance Trial (NPT). **SA** • One of the project partners (MPKV) identified 7 open pollinated varieties of sorghum which are suitable for the target areas. • Another project partner (MAU) has also identified 7 suitable varieties. • A site has been identified at Mehboob baugh farm, in MAU Parbhani, for construction of a seed warehouse. • Development of training materials (flyers) in the Marathi language on purity maintenance in post-rainy season sorghum seed production, and seed storage has been completed in MAU and is in progress in MPKV.

	production, storage and marketing (Y2) • Seed of promoted post-rainy season sorghum varieties produced, stored and distributed to cover 12,000 ha over three years (3,000 ha Y1, 4,000 ha Y2 and 5,000 ha Y3) (Y4) **Pearl millet** • Seed of promoted hybrids purchased in bulk and delivered to target villages • Promoted hybrids demonstrated via test kits marketed in target villages by self-help groups and/or local agro-dealers • Self-help group revolving funds established/strengthened for input marketing • State seed corporations and private-sector seed agencies encouraged to produce and market seed of farmer-preferred hybrids		• Large scale commercial seed multiplication of sorghum was done at the central campus of MPKV, Rahuri (BSP Farm) and at the central farm (MAU), research stations (Badnapur, Parbhani), and at KVK (Ambejogai/Jalna). • Previously multiplied sorghum seed at the central farm of MPKV, Rahuri was distributed to 3,000 farmers, with expected coverage of 1,500 ha in the selected cluster villages and at MAU procured seed was distributed to more than 3,000 farmers (0.4 ha each). A total of 40 tons of seed was multiplied and distributed in the project villages. • Seed of parental lines of 7 pearl millet hybrids identified for adoption trials in 2010 was produced and supplied to APSSDC (Andhra Pradesh State Seed Development Corporation) for hybrid seed production. • Seed of promoted hybrids was purchased from APSSDC and delivered to target clusters in Rajasthan, Gujarat and Haryana. Fertilizer (DAP) was procured and test–kits (seed for a 0.4 ha plot + 25 kg DAP) were developed with the help of farmer organizations and distributed.
	Targeted Outcomes	**Baseline**	**Progress (Y1)**

	Short term • One seed enterprise in each target area produces seed of open-pollinated varieties • Two seed enterprises in each region initiate hybrid seed production • 25% of farmers in pilot sites use improved seed • 10% of area of pilot sites sown to improved varieties **Long term** • Wide-scale adoption of varieties • Sustainable seed production and seed dissemination arrangements • Farmer know-how increased • Increased productivity • More seed companies actively marketing improved quality seed		Nil so far.
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**
Activity 6.3: Increase availability and use of fertilizer and other crop management inputs	**WCA** • Input providers linked to other projects, to facilitate access to training in appropriate use of specific types of fertilizers, seed treatments, herbicides, pest control products and business skills in Mali and Niger (Y3) • Farmer field schools for integrated *Striga* management for pearl millet based systems scaled up in Mali and Nigeria using a range of tools for farmer training (Y2) • Impact of MHM biological control technique extended by INRAN/Maradi quantified on storage moth (Corcyra) in millet granaries at 3 locations in 3 countries (Y3) • Potential for extending use of integrated pearl millet headminer control techniques into new areas		**WCA** • One key participant in the Micro-dosing project was trained in on-farm experimentation and seed diffusion. • 12 demonstrations with 8 varieties and 3 crop improvement options were sown in June. • 22 farmer facilitators from 3 states identified in Nigeria and 12 TOTs and 52 FFS are being established. • In Mali, at least 400 farmers have visited ISSFM demonstration plots. • 6 broadcastings of ISMs in Mali. • 1,000 farmers in Nigeria participated in the CBFFS training sessions.

	understood (Y2) **ESA** • Timely availability of appropriate fertilizers for finger millet and sorghum farmers in Kenya, Ethiopia, and Tanzania increased through agro dealers (Y3) • Input suppliers, agro-dealers and farmer cooperatives provided information and technical support in marketing fertilizer in affordable packs to small-scale farmers (Y4) **SA** **Sorghum** • Farmer groups in cluster villages linked to soil testing facilities and input suppliers (fertilizers and pesticides) (Y2) • Crop management demonstrations conducted in each village cluster (10 per cluster across years) (Y4) **Pearl millet** • Fertilizer included in test kits marketed by village self help groups and/or local agro-dealers • Self-help group revolving funds strengthened with proceeds from test kit sales • Crop management demonstration superimposed on hybrid demonstrations conducted in target villages • Farmer groups in cluster villages linked to soil testing facilities and fertilizer suppliers		**ESA** • 2 farmer organizations have been identified in Tanzania with a total of 801 women and 1849 men farmers in the Kondoa and Dodoma districts. • 50 farmers (0.25 ha each) have been identified for scaling up the finger millet variety Boneya. • 1.2 t of pre-basic sorghum seed of 6 varieties. **SA (Sorghum)** • Linking farmer associations with input suppliers (fertilizer and pesticides) is on-going under MPKV, in the Rahuri region. • MPKV identified soil testing facilities and 100 soil samples from each region encompassing all clusters were collected and analysis reports disseminated to farmers related to this project. • On-station evaluations and front line demonstrations (FLD) were conducted at MPKV (38) and MAU (35). • Best management practices for the target regions to increase the grain and fodder yield of sorghum were identified. **SA (Pearl millet)** • Soil testing facilities were identified in all three states. • Crop management practices were identified and 30 demonstration trials have been planned for each state.
	Targeted Outcomes	**Baseline**	**Progress (Y1)**

	Short term • At least 5 agro-dealers in each target area marketing fertilizer, seed treatments, herbicides and pest control products • Farmer field schools training in integrated *Striga* management • Policy brief on effectiveness of MHM biological control published **Long term** • Wide-scale adoption of fertilizer • Sustainable fertilizer dissemination arrangements • Farmer know-how of *Striga* management and MHM increased • Increased productivity		Nil so far.
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**
Activity 6.4: Improve access to output markets to increase technology adoption and cash incomes for farmers	**WCA** • Link at least two farmer organizations to WFP P4P program in Mali (Y2) • Strengthen 10 farmer unions for collective marketing of sorghum and millets cereals in Burkina Faso, Mali and Niger (Y4) • Improve availability of information on prices, supply and demand for actors along the value chain (producer, traders, processor) in Mali, Niger and Burkina Faso (Y4) **ESA** • Organized farmer groups growing finger millet in Kenya, Tanzania and Uganda linked to Unga Ltd and or other millers to market their surplus grain (Y2) • Organized farmer groups growing sorghum in Ethiopia and Tanzania linked to P4P and food and feed processors to market their surplus grain (Y3)		**WCA** • Meetings with P4P were held, leading to signing a contract between P4P and the ULPC farmers' organization. **ESA** • Meeting held with Unga Mills in Kenya who indicated that they were able to purchase 600 M t of finger millet monthly • A finger millet buyer has been identified in Singida district and there are on-going efforts to identify buyers to be linked with farmer organizations. • A supplier of post- harvest equipment was identified and three sets of equipment (each for Ethiopia, Uganda and Tanzania) consisting of a thresher and a dehuller have been purchased and plans are underway for

	• Information (prices, supply and demand) on finger millet and sorghum integrated into the existing regional market information system managed by East Africa Grain Council (Y2) • Appropriate post-harvest handling and processing equipment (e.g. dehullers, grain threshers and cleaners) demonstrated to farmer groups, women groups and entrepreneurs for reducing drudgery and provide business opportunities at local level (Y4) **SA** **Sorghum** • Farmer groups in cluster villages linked to retail chains and grain wholesalers (Y2) • Farmer groups in cluster villages linked to fodder wholesalers and processors (Y2) **Pearl millet** • Farmer groups in cluster villages linked to retail chains, grain wholesalers and/or livestock feed producers Farmer groups in village clusters linked to fodder wholesalers and processors		testing and delivery to the target areas. **SA** • Identification of retail market chains and grain wholesalers in the target areas is in progress. • Weekly market, village level shop keeper, APMC's, co-operative societies and wholesalers have been identified.
	Targeted Outcomes	**Baseline**	**Progress (Y1)**
	Short-term • Increased grain sales by farmers • Decreased drudgery of grain/food processing for women • Increased income generation opportunities for women • Number of food processing enterprises increased **Long-term** • Increased business activity along the value-chain by existing and new actors		Nil so far.

	• Agro-processors producing a broader range of grain-derived products • Increased income and empowerment of rural and urban women • Improved marketing opportunities for cereal producers		
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**
Activity 6.5: Improve access to finance to increase adoption of purchased inputs and increase demand for sorghum and millets cereal based products	**WCA** • Farmer organizations strengthened at book keeping, (cash flow, profit and loss account) in Burkina Faso, Mali and Niger (Y3) • Linkages established between financial institutions and farmer organizations to access finance for input supply and output marketing in Mali and Niger (Y2) • Warrantage and credit guarantees promoted/strengthened with partners to increase farmer access to input finance for sorghum and millets cereals (link with CNFA and AGRA initiatives) in Mali and Niger (Y4) **ESA** • Capacity of farmer organizations in Ethiopia, Kenya and Tanzania to access finance strengthened (Y3) • Awareness of financial institutions about business opportunities in sorghum and finger millet value chains in Ethiopia, Kenya and Tanzania enhanced (Y3) • Linkages established between financial institutions and farmer organizations to access finance for input supply and output marketing in Ethiopia, Kenya and Tanzania (Y3) • Monitor contractual arrangements between farmer		**<u>WCA</u>** • No activity scheduled for Y1. **<u>ESA</u>** • Talks were initiated with several banks; the Equity Bank of Kenya, Commercial Rural Development Bank (CRDB) and Akiba Banks of Tanzania are willing to provide financial support to farmers that can be linked with industry such as breweries and food processors. • East Africa breweries require 80,000 M t of sorghum per annum. **<u>SA</u>** • Five banks have been identified. • On-going activities include: o Development of a flyer on post-rainy season sorghum value chain and market opportunities; o Iinforming financial institutions about business opportunities from post-rainy sorghum; o Development of training materials (brochure) on good business practice in accessing finance from alternative sources;

	unions and traders (Y2, Y3, Y4) **SA** **Sorghum** • Financial institutions informed about business opportunities along the value chain (Y2) • Farmer organizations in cluster villages strengthened and educated about good business practices in accessing finance from alternative sources (Y4) • Increased farmer access to input finance for input supply and output marketing for post-rainy season sorghum production promoted through warehouse receipts and other schemes (Y4) **Pearl millet** • Financial institutions informed about business opportunities along the value chain • Farmer organizations in cluster villages strengthened and educated about good business practices in accessing finance from alternative sources • Increased farmer access to input finance for input supply and output marketing for sorghum and millets pearl millet promoted through warehouse receipts and other schemes		○ Training of farmers in good business practice.
	Targeted Outcomes	**Baseline**	**Progress (Y1)**
	Short-term • Increased use of purchased inputs by farmers • New approaches to farmer learning used for building farmers' capacity to produce and market grain surplus **Long-term** • Increased consumption of sorghum and millet-		Nil so far.

	based products by human consumers • Increased consumption of sorghum and millet-based products by the livestock industry • Policy reform to support sorghum and millet sub-sector enacted by policy makers • Increased incomes for cereal producers and small scale and industrial processors • Increased access to processed sorghum and pearl millet products in urban markets		
Activities	**Targeted Outputs**	**Baseline**	**Progress (Y1)**
Activity 6.6: Enhance capacity of partners (e.g., NGOs, farmer organizations, private-sector, extension) to deliver appropriate cereal technology options to farmers and increase alternative use of sorghum and millets cereals	**WCA** • ICRISAT and NARS scientists trained in participatory approaches (Y1) • Experiences with integrating delivery of seed, crop management techniques, inputs, and market linkages exchanged among project partners in WCA (Y4) • One MSc student per country trained in technology change (Mali, Niger, Burkina Faso, Nigeria) (Y3) **ESA** • Capacity of scientists enhanced to facilitate choice by partners of appropriate technology for widespread adoption in Eritrea, Ethiopia, Kenya, Southern Sudan, Tanzania, and Uganda (Y2) • Capacity of sorghum extension staff, seed producers and distributors enhanced in preparation for product deployment of African biofortified sorghum anticipating that regulatory systems will be in place (Y3) • Training provided to enhance the agribusiness, grain marketing and managerial skills of farmer organizations in Ethiopia, Kenya and Tanzania (Y3)		**<u>WCA</u>** • 16 representatives from farmer organizations, extension services and NGOs were identified to be trained as trainers. • 14 scientists and research technicians from NARS and ICRISAT were trained in on-farm participatory breeding. • A one-week workshop was held in Koutiala, and attended by 30 participants from Burkina Faso, Mali and Niger, including NARS scientists, farmers and farmer organization agents. **<u>ESA</u>** • A training workshop on PVS and technology delivery for collaborating partners from research, extension, seed production and marketing was held in Singida Tanzania, and attended by 41 participants, comprising 13 women and 28 men. • Potential partners for seed production and distribution were identified. • In Ethiopia, Ethiopian Seed Enterprises (ESE),

	• Training and technical support in finger millet and sorghum seed production for seed companies and seed growers completed in Eritrea, Ethiopia, Kenya, Tanzania and Uganda (Y2) • Training and technical support in integrated *Striga* management for sorghum provided to agricultural service providers e.g. extension, agro-dealers, and farmer associations in Eritrea, Ethiopia, Tanzania and Uganda (Y3) • Training and technical support in integrated blast management for finger millet provided to agricultural service providers e.g. extension, agro-dealers, and farmer associations in Ethiopia, Kenya Tanzania and Uganda(Y3) • Training provided to farmer groups (especially women) on better post-harvest handling and processing techniques in Eritrea, Ethiopia, Kenya, Tanzania and Uganda (Y4) **SA** **Sorghum** • Farmers groups, women's self help groups and KVK field staff trained in post-rainy season sorghum crop management, hybrid parents and hybrids seed production and village seed systems and grain and stover marketing (Y4) • Farmers groups trained in seed storage warehouse management and book-keeping (Y3) • Field days and exposure visits organized for technology demonstration and dissemination for project farmers (Y4) **Pearl millet** • Farmers' groups, women's self-help groups and KVK field staff trained in pearl millet crop		regional seed enterprises, the Ethiopian Seed Association, research institutes, and NGOs have been identified as potential partners for sorghum seed production and will be engaged in the 2010 cropping season. • In Eritrea, farmer groups, individual lead farmers and government agencies were identified as avenues for sorghum seed production. • A draft training manual on finger millet integrated blast management was developed and TOT is planned for September and October 2010. **SA** • Training material (one flyer each) was produced for soil sampling, post-rainy season sorghum crop management, seed production, village seed systems and grain and stover marketing in the target areas. • Training of farmers, development of information and field days are on-going.

	management and marketing • Field days and exposure visits organized for technology demonstration and dissemination for project farmers		
	Targeted Outcomes	**Baseline**	**Progress (Y1)**
	Short term • Enhanced capacity of NARS and ICRISAT to engage with NGOs, farmer organizations, private-sector, and extension • Project partners choose appropriate methodologies for development oriented crop improvement research • Partners make better choices for appropriate technologies • Enhanced collaboration between stakeholders/development investors • Increased private-sector investment along the sorghum and millets cereal value chain **Long term** • Sorghum and millets cereal research more effective and efficient • Farmers have more technology options available to increase productivity, quality and sustainability of sorghum and millets cereal cultivation		A short term outcome is that there have been effective linkages with other organizations and farmers are better informed about management of stresses that can limit productivity.

Appendix B - Timeline and Milestones

Project Name: HOPE for Sorghum and Millets

Vision of success:

During the first phase will be to improve productivity of sorghum, pearl millet and finger millet by 35-40% through introduction of improved technologies and market innovations that increase adoption and profitability to 110,000 households in sub-Saharan Africa and 90,000 in South Asia. Within ten years the project will benefit 1.1 million households in SSA and 1.0 million in SA.

		Year 1												Year 2												Year 3												Year 4												
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
		2009							2010												2011												2012												2013					
		6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5
		Major Activities																																															
Objective 6: Enable technology adoption of sorghum, pearl millet, and finger millet by improving access to seeds, markets, inputs, know-how and finance in WCA, ESA, and SA	Activity 1 WCA							1		2		3								4, 8		5	9	6, 7	10																				11			
	Activity 1 ESA												1				6			2,3,4			7,8		5,9,10,11						12, 14					10, 11, 15				16,17			12			13		10,11 ,18
	Activity 1 SA (SO)			1				2, 3, 4			8			5, 9, 10		6, 7																															
	Activity 1 SA (PM)			11,19	12	13	14			15,16,17	19	20	21, 22																																			
	Activity 2 WCA	6			36	17	21	10	11	8, 12		1, 13,	1, 2,	6		3, 7	31, 33,			4, 14		8, 15,	19, 24	16, 38	1, 2, 6, 28			3, 7	22, 31,			4		8, 37	24, 25,	38	2, 6,			3, 7	20, 31, 34			4, 5, 9		8, 37		38	
	Activity 2 ESA										1		4, 8,10				2						12, 13,		3,5,6 9,10						19				14, 17, 18,		5, 6,9 ,10 ,								20		5,6,7, 9,10, 11,15 ,16,2 1,22
	Activity 2 SA (SO)			1, 11	12			5				2, 8		13					6, 7	9, 10				3, 4, 14, 15		14												15, 16											
	Activity 2 SA (PM)					15	16,17							18	19, 20	21		15	16, 17							18	19, 20	21		15	16, 17							18	19, 20	21		15	17						
	Activity 3 WCA		4			2, 3, 5,				6		12, 13	1, 14		7		9	2, 3, 11						12, 13				10		2, 3, 11					12, 13	15, 16											
	Activity 3 ESA												1												4						2			3									5		6			
	Activity 3 SA (SO)					5								1	2	3, 4							6				2							6				2							6, 7		
	Activity 3 SA (PM)									8	9		10, 11	12	13, 14	15, 16							9		10	12	13, 14	15, 16							9		10	12	13, 14	15, 16					9		10
	Activity 4 WCA							1, 4				5, 6	2, 3			9		10						5, 6	8					11				7	5, 6	8, 12											
	Activity 4 ESA												1,4, 7,8, 9,1										2,5, 10		3											6,13						12	14				
	Activity 4 SA (SO)										1, 4								2, 3, 5, 6																													
	Activity 4 SA (PM)								7, 10				8, 9,																																			
	Activity 5 WCA																		1, 8	4	8	5			6, 7					2			10				3							9			10	
	Activity 5 ESA																	1		2		4		5	6,11					7				8			3,11				9			10				11
	Activity 5 SA (SO)								7			1			2, 3	4, 5				8					9			5			8						9			5, 6			8						9, 10
	Activity 5 SA (PM)						11		12,13	14	17		15, 18												15, 18												15, 16,											
	Activity 6 WCA							1, 2								7		3, 4, 5							8, 9							5, 6												4				
	Activity 6 ESA										1		3,9, 16				2,4,10						6,13		14				11,17			5,12		15, 18		7,8											19
	Activity 6 SA (SO)								1							8	2	9					4	5					2	9					6, 7					2, 3	9, 10							
	Activity 6 SA (PM)										11		12	14			15								12	14			15							12, 13	14			15, 16								

Annual Budget:	$1,197,922	$1,198,081	$1,197,498	$1,197,723

			PROPOSED NEW DEADLINES
Objective 6	**Enable technology adoption of sorghum, pearl millet, and finger millet by improving access to seeds, markets, inputs, know-how and finance in ESA, WCA, and SA**		
Activity 1	Region	**Increase farmers' access and use of knowhow about the use and benefits of profitable crop management technologies and improved cultivars**	
Milestones:	WCA	1. Draft training manual on integrated Striga management for pearl millet based systems in the Sahelian zone of Mali reviewed by communication specialist (Dec 2009)	June 2011
	WCA	2. Revised draft training manual on integrated Striga management for pearl millet based systems in the Sahelian submitted for language editing (Feb 2010)	
	WCA	3. Training manual in English on integrated Striga management for pearl millet based systems in the Sahelian zone of Nigeria published (Apr 2010)	
	WCA	4. Training manual in French on integrated Striga management for pearl millet based systems in the Sahelian zone of Mali published (Feb 2011)	
	WCA	5. Training manuals in two languages on integrated Striga management for pearl millet based systems in the Sahelian zone of Mali and Nigeria published and distributed	
	WCA	6. Rural Radio programs on availability of new seed in each of the six target areas broadcast (Jul 2009, 2010, 2011, 2012)	
	WCA	7. Experienced farmer facilitators of FFS for Integrated Striga and Headminer Management practices, including soil fertility and water management, develop key radio messages (Nov 2010)	
	WCA	8. Radio program on Integrated Striga management, Integrated Headminer Management and soil fertility management tested in appropriate target areas (Mar 2011)	
	WCA	9. Radio program on ISM braodcast in four target areas in Bambara (May 2011)	
	WCA	10. Radio progams adapted to include market information, based on improved understanding of local markets (Mar 2012)	
	WCA	11. Radio programs in two languages on variety characteristics, crop management options and market information broadcast (Mar 2013)	
	ESA	1. Training manual in English on integrated Striga management and micro-dosing for sorghum developed (May 2010)	
	ESA	2. Training manual in Tigrinya on integrated Striga management and micro-dosing for sorghum developed (December 2010)	
	ESA	3. Training manuals in Amharic and Oromifa on integrated Striga management and micro-dosing for sorghum developed (December 2010)	
	ESA	4. Training manual in Swahili on integrated Striga management and micro-dosing for sorghum developed (December 2010)	
	ESA	5. Training manuals in five languages on integrated Striga management and micro-dosing for sorghum based systems developed (May 2011)	
	ESA	6. Training manual in English on integrated blast and weed management and micro-dosing for finger millet developed (September 2010)	
	ESA	7. Training manual in Amharic on integrated blast and weed management and micro-dosing for finger millet developed (March 2011)	
	ESA	8. Training manual in Swahili on integrated blast and weed management and micro-dosing for finger millet developed (March 2011)	
	ESA	9. Training manuals in three languages on integrated blast and weed management and micro-dosing for finger millet developed (May 2011)	
	ESA	10. 30 farmer participatory on-farm demonstrations and two field days on integrated Striga management - including locally-adapted Striga-resistant sorghum varieties and micro-dosing - conducted in Eritrea (May 2011, 2012, 2013)	
	ESA	11. 30 farmer participatory on-farm demonstrations and two field days on integrated Striga management - including locally-adapted Striga-resistant sorghum varieties and micro-dosing - conducted in Ethiopia (May 2011, 2012, 2013)	
	ESA	12. 30 farmer participatory on-farm demonstrations and two field days on integrated Striga management - including locally-adapted Striga-resistant sorghum varieties and micro-dosing - conducted in Tanzania (Dec 2011, 2012)	
	ESA	13 Awareness and knowhow of farmers on integrated Striga management and micro-dosing for sorghum increased through participatory on-farm demonstrations in three countries (March 2013)	
	ESA	14. 30 farmer participatory on-farm demonstrations and two field days on integrated blast and weed management - including locally-adapted blast-resistant finger millet varieties and micro-dosing - conducted in Ethiopia (Dec 2011)	
	ESA	15. 30 farmer participatory on-farm demonstrations and two field days on integrated blast and weed management - including locally-adapted blast-resistant finger millet varieties and micro-dosing - conducted in Kenya (May 2012)	

	ESA	16. 30 farmer participatory on-farm demonstrations and two field days on integrated blast and weed management - including locally-adapted blast-resistant finger millet varieties and micro-dosing - conducted in Tanzania (September 2012)	
	ESA	17. 30 farmer participatory on-farm demonstrations and two field days on integrated blast and weed management - including locally-adapted blast-resistant finger millet varieties and micro-dosing - conducted in Uganda (September 2012)	
	ESA	18. Awareness and knowhow of farmers on integrated blast and weed management for finger millet increased through participatory on-farm demonstrations in four countries (May 2013)	
	SA (SO)	1. Meeting NRCS, Rajendranagar; MPKV, Rahuri and MAU, Parbhani officials on finalization of villages in each cluster (August 2009)	
	SA (SO)	2. Data collection on the postrainy season sorghum growing areas in Parbhani and Rahuri regions and identification of villages (5) in each of the three clusters in target regions (December 2009)	
	SA (SO)	3. Identification of secondary diffusion area villages associated with each cluster (10 villages per cluster) and refining them through discussions with MAU and MPKV scientists (December 2009)	
	SA (SO)	4. Three clusters of 5 villages established in each Parbhani and Rahuri regions (6 clusters total) and secondary diffusion areas identified (December 2009)	
	SA (SO)	5. Conducting village meetings (one meeting each) in the cluster villages to motivate the farmers to become the partners in project implementation (June 2010)	
	SA (SO)	6. Taking steps to help farmers to form farmer associations for each cluster (August 2010)	
	SA (SO)	7. Farmers' associations established in each cluster (August 2010)	
	SA (SO)	8. Developing flyers (one each) on existing cultivars, crop management technology and market options (March 2010)	
	SA (SO)	9. Conducting village meetings (one in each village) to motivate the farmers about the importance of post rainy season sorghum and methods to increase productivity and profitability (June 2010)	
	SA (SO)	10. Outreach strategy developed to create awareness about improved varieties and profitable crop management technologies and market opportunities developed and communicated (June 2010)	
	SA (PM)	11. Two clusters of target villages (4 per cluster) established in Rajasthan and Haryana (August 2009)	
	SA (PM)	12. Two clusters of target villages (4 per cluster) established in Gujarat (September 2009)	
	SA (PM)	13. Identification of secondary diffusion area target villages associated with each cluster (10 per cluster) and refining them through discussions (October 2009)	
	SA (PM)	14. Two clusters of target villages (4 each) established in each of Rajasthan, Gujarat and Haryana (November 2009)	
	SA (PM)	15. Meetings conducted (one meeting each) with farmers' associations/self help groups in the cluster villages in Rajasthan and Haryana to motivate them to become the partners in project implementation (February 2010)	
	SA (PM)	16. Meetings conducted (one meeting each) with farmers' associations/self help groups in the cluster villages in Gujarat to motivate them to become the partners in project implementation (February 2010)	
	SA (PM)	17. Farmers' associations/self help groups strengthened in each village cluster (February 2010)	
	SA (PM)	18. Flyers (one each per state) on adapted pearl millet hybrids, crop management technology and market options developed in local language (Hindi) for Rajasthan and Haryana (February 2010)	
	SA (PM)	19. Flyers (one each) on adapted pearl millet hybrids, crop management technology and market options developed in local language (Gujarati) for Guajarat (March 2010)	
	SA (PM)	20. Village meetings conducted (one in each village) in clusters in Rajasthan and Haryana to motivate the farmers about the importance of pearl millet and methods to increase productivity and profitability (April 2010)	
	SA (PM)	21. Village meetings conducted (one in each village) in clusters in Gujarat to motivate the farmers about the importance of pearl millet and methods to increase productivity and profitability (May 2010)	
	SA (PM)	22. Outreach strategy developed to create awareness about improved varieties and profitable crop management technologies developed and implemented (May 2010)	
Activity 2	Region	**Increase availability and use of quality seeds of improved varieties**	
Milestones:	WCA	1. Seed of sorghum and pearl millet experimental varieties produced for inclusion in testkits (April 2010)	
	WCA	2. A total of 1500 pearl millet variety test kits provided to farmer organisations, local agro-dealers, extension offices for sale and targeted distribution, based on village level requests (May 2010, 2011, 2012)	May 2010 **(October 2010)**
	WCA	3. Sale and distribution lists collected with feedback from agro-dealers and other distributors (Aug 2010, 2011, 2012)	

WCA	4. Sample of farmers who purchased 2010 variety kits visited by technical partners and reported (Dec 2010, 2011, 2012)	
WCA	5. 4,500 farmer variety kits with pearl millet in the Sahelian zone distributed by farmer associations, private sector or extension services groups in Niger, Mali and Nigeria (December 2012)	
WCA	6. A total of 1250 sorghum variety test kits provided to farmer organisations, local agro-dealers, extension offices for sale and targeted distribution, based on village level requests (June 2009, May 2010, 2011, 2012)	
WCA	7. Sale and distribution lists collected with feedback from agro-dealers and other distributors (Aug 2010, 2011, 2012)	
WCA	8. Sample of farmers who purchased variety kits visited by technical partners and reported (Feb 2010, 2011, 2012, 2013)	
WCA	9. 5,000 farmer variety kits with sorghum distributed by farmer associations, private sector extension services in Mali, Burkina Faso and Nigeria (Dec 2012)	
WCA	10. Training manual on seed production for pearl millet OPV's in the Sahelian zone drafted (Dec 2009)	
WCA	11. Draft training manual on seed production for pearl millet OPV's in the Sahelian zone reviewed by communication specialist (Jan 2010)	
WCA	12. Revised draft training manual on seed production for pearl millet OPV's in the Sahelian zone submitted for language editing (Feb 2010)	
WCA	13. Training manual in English on seed production for pearl millet OPV's in the Sahelian zone published (Apr 2010)	
WCA	14. Training manual in Haoussa on seed production for pearl millet OPV's in the Sahelian zone of Nigeria and Niger published (Dec 2010)	
WCA	15. Training manual in French on seed production for pearl millet OPV' in the Sahelian zone published (Feb 2011)	
WCA	16. Training manual in Bambara on seed production for pearl millet OPV's in the Sahelian zone of Mali published (Apr 2011)	
WCA	17. Existing French training manual on seed production for sorghum OPV's in Burkina Faso adapted for Mali (Oct 2009)	
WCA	18. Training manual in French on seed production for sorghum OPV's in Mali published (Apr 2010)	
WCA	19. Training manual on seed production for sorghum OPV's adapted to Nigerian conditions and translated to English (Mar 2011)	
WCA	20. Seed production training manuals for open-pollinated varieties of pearl millet and sorghum published in English, French in Mali, Niger and Nigeria (September 2012)	
WCA	21. Four farmer associations trained in seed production, storage and marketing for pearl millet in Niger (Nov 2009)	
WCA	22. Four farmer associations trained in seed production, storage and marketing for sorghum in Mali (Apr 2010)	**September 2010**
WCA	23. Two farmer asociations trained in sorghum and pearl millet seed production, storage and marketing in Burkina Faso (May 2010)	
WCA	24. Business and marketing plans reviewed with previously trained associations (Mar 2011, 2012)	
WCA	25. Ten farmer associations, and individual members trained in seed marketing and business skills (March 2012)	
WCA	26. At least 50 kg of breeder seed of each requested improved open-pollinated variety of pearl millet and sorghum, produced by ICRISAT and NARS partners (May 2010)	**May 2011**
WCA	27. One hundred kg of foundation seed of at least 8 sorghum open-pollinated varieties produced annually in each country (May 2010)	
WCA	28. Five hundred kg of foundation seed of at least 5 open-pollinated pearl millet varieties under dissemination produced by ICRISAT, NARS in Niger, Nigeria, Mali and Burkina Faso (May 2011)	
WCA	29. At least 10 tons of certified or quality declared seed (QDS) produced by farmer groups and/or seed companies of pearl millet, and 5 tons of an open-pollinated variety of sorghum in each country in years two and three (May 2012)	
WCA	30. Ten tons of certified and QDS millet and sorghum seed disseminated through farmer organizations and agro-dealers in Mali, Niger, Burkina Faso and Nigeria (May 2012)	
WCA	31. Profitability of sorghum seed sales monitored yearly with farmer organizations (Sep 2010, 2011, 2012)	
WCA	32. Monitoring data for the sorghum variety test kits analysed for the effect on farmers awareness of new varieties, and initial adoption (Mar 2012)	

WCA	33. Profitability of seed sales and initial variety adoption of sorghum varieties as a result of commercialization of Farmer Variety Kits assessed (May 2012)	
WCA	34. Profitability of pearl millet seed sales monitored yearly with agro-dealers, and farmer organizations (Sep 2010, 2011, 2012)	
WCA	35. Monitoring data for the pearl millet variety test kits analysed for the effect on demand of certifed seed (Mar 2012)	
WCA	36. Profitability of seed sales, and increase of demand for quality seed of improved pearl millet varieties as a result of commercialization of Farmer Variety Kits in Mali and Niger assessed (May 2012)	
WCA	37. Annually farmer feedback on experiences with varieties in the disemination program collated, together with quantitiative monitoring results (Feb 2011, 2012, 2013)	
WCA	38. Country reports on farmer-preferred varieties and new crop management options with potential for more wide-spread adoption published on-line, on a yearly basis (Apr 2011, 2012. 2013)	
ESA	1. Assemble seed certification standards for sorghum (Eritrea, Ethiopia and Tanzania, and regionally-agreed standards from SADC and ASARECA) and finger millet (Ethiopia, Kenya, Tanzania and Uganda, and regionally-agreed standards from SADC and ASARECA) by March 2010	
ESA	2. NARS breeders and seed certification agencies in Eritrea, Ethiopia, Kenya, Tanzania and Uganda review drafts prepared by ICRISAT (September 2010)	
ESA	3. Handbook for production of quality seed of improved finger-millet and sorghum varieties developed and distributed to seed companies, farmer associations and other interested parties (May 2011)	
ESA	4. 25 kg of breeder seed of each of the 6 improved finger millet variety listed in the technology inventory annex produced in year one (May 2010)	
ESA	5. 2,500 kg of foundation seed of the 6 improved finger millet variety produced and maintained annually from breeder seed a in Ethiopia, Kenya, Tanzania and Uganda in years one (from ICRISAT stock) and subsequnetly by seed companies or contracted farmers (May 2011, May 2012 and May 2013)	
ESA	6. 2,000 kg of certified seed of finger millet produced by seed companies (farmer unions in Ethiopia) in Ethiopia, Kenya, Tanzania and Uganda in year one, 25,000 kg in year two, and 50,000 kg in Y3 and Y4 (May 2010, May 2011, May 2012, May 2013)	
ESA	7. Quality seed of improved finger millet varieties produced and distributed through agro-dealers, NGO's, extension services, farmer associations and cooperatives (May 2013)	
ESA	8. 50 kg of breeder seed of each of the 8 improved open-pollinated sorghum variety listed in the technology inventory annex produced in year one (May 2010)	
ESA	9. 3,000 kg of foundation seed of the 8 improved open-pollinated sorghum variety produced from breeder seed in Eritrea, Ethiopia and Tanzania in year one (from ICRISAT stock), and 4,500 kg in Y2-Y4 (May 2011, May 2012, May 2013)	
ESA	10. 3,000 kg of certified seed of sorghum produced by seed companies in Eritrea, Ethiopia and Tanzania in year one and 20,000 kg in year two, and 110,000kgs in Y3 and Y4 (, May 2010, 2011, May 2012, May 2013)	May 2010 **(December 2010)**
ESA	11. Quality seed of improved sorghum varieties produced and distributed through agro-dealers, NGO's, extension services, farmer associations and cooperatives (May 2013)	
ESA	12. At least 1,000 small seed packs of certified finger millet and sorghum promoted through agro-dealers in Kenya and Uganda (finger millet only), and Tanzania (March 2011)	
ESA	13. At least 1,000 small seed packs of certified finger millet and sorghum made available to members of farmer unions in Ethiopia and costs recovered from grain sales (March 2011)	
ESA	14. At least 500 small seed packs of foundation seed of finger millet and sorghum varieties to support local seed systems sold to farmers, farmer associations, and schools in Eritrea (sorghum only), Ethiopia, Tanzania (finger millet and sorghum), Kenya and Uganda (finger millet only) (March 2012)	
ESA	15. Ten tons of certified seed of sorghum varieties marketed by the government seed agency in Eritrea (March 2013)	
ESA	16. Availability of seeds of improved finger millet and sorghum varieties increased (May 2013)	
ESA	17. Country report on farmer-preferred sorghum varieties and seed dissemination experiences targeting policy makers in Eritrea prepared (March 2012)	
ESA	18. Country report on farmer-preferred finger millet and sorghum varieties and seed dissemination experiences targeting policy makers in Ethiopia prepared (March 2012)	
ESA	19. Country report on farmer-preferred finger millet varieties and seed dissemination experiences targeting policy makers in Kenya prepared (December 2011)	
ESA	20. Country report on farmer-preferred finger millet and sorghum varieties and seed dissemination experiences targeting policy makers in Tanzania prepared (March 2013)	
ESA	21. Country report on farmer-preferred finger millet varieties and seed dissemination experiences targeting policy makers in Uganda prepared (March 2013)	
ESA	22. Country reports on farmer-preferred varieties and seed dissemination experiences targeting policy makers completed (May 2013)	
SA (SO)	1. Identification of OPVs (3-4) suitable to the target areas based on existing knowledge (August 2009)	

	SA (SO)	2. Production of breeder/foundation seed of identified OPVs (200 Kg) to meet the requirements in the next season (April 2010)	
	SA (SO)	3. Production of breeder/foundation seed of identified OPVs (250 Kg) to meet the requirements in the next season (April 2011)	
	SA (SO)	4. Breeder/foundation seed of promoted varieties produced to feed seed supply chain (April 2011)	
	SA (SO)	5. Identification of appropriate site for seed warehouse (one) establishment in MAU region (December 2009)	
	SA (SO)	6. Construction of the seed warehouse in MAU region (November 2010)	
	SA (SO)	7. One warehouse for post-rainy season sorghum seed storage established in MAU region (November 2010)	
	SA (SO)	8. Developing training material (one flyer each) in Marathi language on purity maintenance in postrainy season sorghum seed production, seed storage and seed marketing (April 2010)	
	SA (SO)	9. Imparting training to progressive farmers (100) and KVK and SAU field staff (20) in postrainy season sorghum seed production, storage and marketing (December 2010)	
	SA (SO)	10. Progressive farmers and KVKs identified and trained in post-rainy season sorghum seed production, storage and marketing (December 2010)	
	SA (SO)	11. Identification of suitable areas (2-3) to undertake large scale commercial seed multiplication (August 2009)	
	SA (SO)	12. Procuring the commercial seed of released varieties and distributing to farmers (200 farmers over 100 ha) in the target regions (September 2009)	
	SA (SO)	13. Undertaking of seed multiplication (40 tonnes) in the identified areas and distributed in the project villages (June 2010)	
	SA (SO)	14. Undertaking of seed multiplication (50 tonnes) in the identified areas (April 2011) and seed stored in the warehouse MAU region and seed distributed to project villages (June 2011)	
	SA (SO)	15. Undertaking of seed multiplication (50 tonnes) in the identified areas (April 2011) and seed stored in the warehouse MAU region and seed distributed to project villages (June 2012)	
	SA (SO)	16. Seed of promoted postrainy season sorghum varieties produced, stored and distributed to cover 12,000 ha over three years (3K Y1, 4K Y2 and 5K 3Y) (June 2012)	
	SA (PM)	17. Parental line breeder seed seed stocks of promoted hybrids produced/available to feed hybrid seed supply chain (October 2009, 2010, 2011, 2012)	
	SA (PM)	18. Indents placed with seed production agencies for supply of promoted hybrids (November 2009, 2010, 2011)	
	SA (PM)	19. State seed corporations and private-sector seed agencies encouraged to produce and market seed of farmer-preferred hybrids (November 2009, 2010, 2011, 2012)	
	SA (PM)	20. Seed of promoted hybrids purchased in bulk and delivered to target villages (June 2010, June 2011, June 2012)	
	SA (PM)	21. Farmers's assocations/self-help groups produce test kits (hybrid seed + fertilizer) of promoted technology inputs (July 2010, 2011, 2012)	
	SA (PM)	22. Promoted hybrids demonstrated via test kits marketed in target villages by self-help groups and/or local agro-dealers (July 2010, 2011, 2012)	
	SA (PM)	23. Self-help group revolving funds established/strengthened for future input marketing with proceeds from test kit sales (August 2010, 2011, 2012)	
Activity 3	Region	**Increase availability and use of fertilizer and other crop management technologies**	
Milestones:	WCA	1. Ensure that agro-dealers operating in the project target areas can participate in training programs conducted by other projects (May 2010)	
	WCA	2. Farmer organization leaders, extension personnel, input dealers particiipte in evaluation visits of crop improvement trials in their area (Oct 2009, 2010, 2011)	
	WCA	3. Input providers linked to other projects, to facilitate access to training in appropriate use of specific types of fertilizers, seed treatments, herbicides, pest control products and business skills in Mali and Niger (Oct 2011)	
	WCA	4. Planning and refresher training workshop with at least 20 experienced farmer facilitators from previous FFS in Tominian (Mali) and Yobe state in Nigeria on making ISM technologies and know-how available on a large scale (Jul 2009)	
	WCA	5. Support farmer field school groups (at least 15) with accessing necessary inputs, and observation tools, as well as training materials (Oct 2009)	**September 2011**
	WCA	6. Prepare first draft of DVD based film materials for each ISM training session to reduce training time in the experimental fields (Feb 2010)	**February 2011**

WCA	7. Monitor performance of ISM and control plots managed with decreasing involvement of technical personnel (September 2010)	
WCA	8. Farmer field schools for integrated Striga management for pearl millet based systems scaled up to reach 1000 farmers in Mali and Nigeria using a range of tools for farmer training (Sept 2010)	
WCA	9. MHM biological control technique extended to 3 new areas in each of Niger, Burkina faso and Mali (May 2010)	**May 2011**
WCA	10. Impact of MHM biological control technique, extended at various times by Inran/Maradi, on storage moth (Corcyra) in millet granaries assessed in several locations in each of Niger, Burkina Faso and Mali (May 2012)	
WCA	11. Impact of MHM biological control technique extended by INRAN/Maradi quantified on storage moth (Corcyra) in millet granaries at 3 locations in 3 countries (May 2012)	
WCA	12. Farmers' groups, in villages requesting the training, learn the techniques for biological control of the pearl millet headminer (August 2010)	
WCA	13. Impact on the parasitization of the pearl millet grain and the grain caterpillar (Corcyra cephalonica) studied in areas using the biological control techniques (May 2011)	
WCA	14. Potential for extending use of integrated pearl millet headminer control techniques into new areas understood (May 2011)	
ESA	1. Farmer organizations growing finger millet and sorghum in Ethiopia, Kenya (finger millet only) and Tanzania linked to fertilizer suppliers and agro-dealers (May 2010)	**December 2010**
ESA	2. Input suppliers and agro-dealers within five kilometers of targeted farmer organizations given technical training in micro-dosing technology for sorghum and finger milllet (Dec 2011)	
ESA	3. Timely availability of appropriate fertilizers for finger millet and sorghum farmers in Ethiopia, Kenya and Tanzania increased through agro-dealers (Mar 2012)	
ESA	4. Economically viable size packs for different types of fertilizers determined in Ethiopia, Kenya, and Tanzania (May 2011)	
ESA	5. Profitability benefits from marketing fertilizer in small packs assessed and shared with suppliers and retailers (Dec 2012)	
ESA	6. Input suppliers, agro-dealers and farmer cooperatives provided information and technical support in marketing fertilizer in affordable packs to small-scale farmers (March 2013)	
SA (SO)	1. Identification of soil testing facilities (one lab in each region) and linking the farmers associations with the soil testing facilities (June 2010)	
SA (SO)	2. Collection of soil samples (100 in each region encompassing all clusters) and dissemination of soil test analysis reports (July 2010, 2011and 2012)	
SA (SO)	3. Linking the farmers associations (6) with the input suppliers (fertilizer and pesticides) in the target areas (August 2010)	
SA (SO)	4. Farmer groups in cluster villages linked to soil testing facilities and input suppliers (fertilizers and pesticides) (August 2010)	
SA (SO)	5. Identification of best management practices (fertilizer, spacing, insects and drought management) for the target regions (September 2009)	
SA (SO)	6. Conducting Frontline demonstrations (10 per cluster across years) on the farmers fields (March 2011, 2012 and 2013)	
SA (SO)	7. Crop management demonstrations conducted in each village cluster (10 per cluster across years) (March 2013)	
SA (PM)	8. Identification of soil testing facilities (one lab in each region) and linking the farmers' associations/Self help groups with these soil testing facilities (February 2010)	**August 2010**
SA (PM)	9. Farmers' associations/self-help groups collect 20 soil samples per cluster (120 across all 6 clusters) and submit to testing facilities (March 2010, 2011, 2012 and 2013)	March 2010 **(August 2010)**
SA (PM)	10. Soil test analysis reports disseminated and discussed with farmers' associations/self help groups (May 2010, 2011, 2012 and 2013)	May 2010 **(September 2010)**
SA (PM)	11. Farmer groups in cluster villages linked to soil testing facilities and fertilizer suppliers (May 2010)	**September 2010**
SA (PM)	12. Complex fertilizer purchased in bulk and delivered to target village clusters (June 2010, 2011 and 2012)	
SA (PM)	13. Farmers's assocations/self-help groups produce test kits (hybrid seed + fertilizer) of promoted technology inputs (July 2010, 2011 and 2012)	
SA (PM)	14. Test kits marketed in target villages by self-help groups and/or local agro-dealers (July 2010, 2011 and 2012)	
SA (PM)	15. Self-help group revolving funds strengthened with proceeds from test kit sales (August 2010, 2011 and 2012)	

	SA (PM)	16. Crop management demonstration superimposed on hybrid demonstrations conducted in target villages (August 2010, 2011 and 2012)	
Activity 4		**Improve access to output markets to increase technology adoption and cash incomes for farmers**	
Milestones:	WCA	1. Agreement between WFP-Mali and ICRISAT and partners on contributions to achieving the project outputs developed (Dec 2009)	
	WCA	2. Complimentarities between the two projects identified and implemented to further progress towards planned outputs (May 2010)	
	WCA	3. Link at least two farmer organizations to WFP P4P program in Mali (May 2010)	
	WCA	4. Conduct with farmer organizations an analysis of strengths, weaknesses, needs and opportunities for business and marketing skills for cereal grain (December 2010)	
	WCA	5. Organize consultative meetings between farmer unions and traders and other end-users to discuss options to improve marketing efficiency (April 2010, 2011, 2012)	April 2010 **(April 2011)**
	WCA	6. Assist farmer organizations with contractual arrangements between farmer unions and traders (Aug 2010, 2011, 2012)	
	WCA	7. Technical brief on strategies on enhancing market efficiency through farmers groups (March 2013)	
	WCA	8. Strengthen 10 farmer unions for collective marketing of dryland cereals in Burkina Faso, Mali, Niger (May 2013)	
	WCA	9. Contract with MIS to collect and disseminate information on supply, demand and prices of sorghum and pearl millet (Aug 2010)	
	WCA	10. Provide market information through 2 information pathways (rural radios linked to market information systems in Mali, Niger and Burkina Faso; and cell phones linked to MIS within countries) (Oct 2010)	
	WCA	11. Assess the contribution of MIS to market efficiency (more grain delivered to market, better quality grain delivered, higher farm gate prices, lower marketing costs and adoption of new technologies) (Oct 2011, Oct 2012)	
	WCA	12.Improve availability of information on prices, supply and demand for actors along the value chain (producer, traders, processor) in Mali, Niger and Burkina Faso (May 2013)	
	ESA	1. Organized farmer groups growing finger millet in Kenya (2), Tanzania (2) and Uganda (2) identified and briefed on marketing opportunities by Unga Ltd officials (May 2010)	**December 2010**
	ESA	2. 3 Organized farmer groups (one each form Kenya, Ugnada and Tanzania) provided technical support in production and post-harvest handling to meet the grades and standards required by Unga Ltd (March 2011)	
	ESA	3. 3 to 5 Organized farmer groups growing finger millet in Kenya, Tanzania and Uganda linked to Unga Ltd and /or other millers to market their surplus grain (May 2011)	
	ESA	4. Organized farmer groups growing sorghum in Ethiopia (2) and Tanzania (2) identified and briefed on marketing opportunities and quality specifications by P4P officials and food and feed processors (May 2010)	**December 2010**
	ESA	5. 2 Organized farmer groups provided technical support in production and post-harvest handling of sorghum to meet the grades and standards reguired by P4P officials and food and feed processors (March 2011)	
	ESA	6. 2-4 Organized farmer groups growing sorghum in Ethiopia and Tanzania linked to P4P and food and feed processors to market their surplus grain (May 2012)	
	ESA	7. Information (prices, supply and demand) on finger millet in Tanzania, Ethiopia, Kenya and Uganda assembled and included on the website (May 2010)	**December 2010**
	ESA	8. Information (prices, supply and demand) on sorghum in Tanzania, Ethiopia and Eritrea assembled and included on the website (May 2010)	**December 2010**
	ESA	9. Strategy for regular updating and delivery of market information developed and linked to East African Grain Council (May 2010)	**December 2010**
	ESA	10. Information (prices, supply and demand) on finger millet and sorghum integrated into the existing regional market information system managed by East Africa Grain Council (March 2011)	
	ESA	11. Suppliers of post-harvest handling equipment for finger millet and sorghum identified and one set of equipment procured for each country - Ethiopia, Tanzania and Uganda (May 2010)	
	ESA	12. Entrepreneurs or farmer groups identified in project areas to operate procured equipment, simple business plan developed, and equipment handed over to identified entrepreneurs as a loan repayable in installments (December 2012)	
	ESA	13. Entrepreneurs or farmer groups provided with technical and business support as part of a business incubation plan (May 2012)	
	ESA	14. Appropriate post-harvest handling and processing equipment (e.g. dehullers, grain threshers and cleaners) demonstrated to farmer groups, women groups and entrepreneurs for reducing drudgery and provide business opportunities at local level (January 2013)	
	SA (SO)	1. Identification of retail market chains (one in each region) and grain wholesalers in the target areas (March 2010)	

	SA (SO)	2. Linking of farmers associations (6) to the identified retail market chains (one in each region) and grain wholesalers in the target areas (November 2010)	
	SA (SO)	3. Farmer groups in cluster villages linked to retail chains and grain wholesalers (November 2010)	
	SA (SO)	4. Identification of fodder wholesalers and processors (one in each region) in the two target regions (March 2010)	
	SA (SO)	5. Linking of farmers associations (6) to the identified fodder wholesalers and processors (one in each region) in the target regions (November 2010)	
	SA (SO)	6. Farmer groups in cluster villages linked to fodder wholesalers and processors (November 2010)	
	SA (PM)	7. Identification of retail market chains (one in each state), grain wholesalers, and/or livestock feed producers in the target areas (January 2010)	**August 2010**
	SA (PM)	8. Farmers associations in each cluster linked to the identified retail market chains (one in each state), grain wholesalers, and/or livestock feed producers in the target areas (May 2010)	
	SA (PM)	9. Farmer groups in cluster villages linked to retail chains, grain wholesalers, and/or livestock feed producers (May 2010)	**September 2010**
	SA (PM)	10. Identification of fodder wholesalers and processors (one in each state) in the target areas (January 2010)	**August 2010**
	SA (PM)	11. Farmers associations in each cluster linked to the identified fodder wholesalers and processors in the target areas (May 2010)	**Augusst 2010**
	SA (PM)	12. Farmer groups in selected village clusters linked to fodder wholesalers and processors (May 2010)	**September 2010**
Activity 5	**Region**	**Improve farmers' access to finance to increase adoption of purchased inputs, production of seed, and surplus grain for marketing**	
Milestones:	WCA	1. Identify the needs of and train farmers' organizations in book keeping, elaborating simple business plans and acquiring organizational skills (Nov 2010)	
	WCA	2. Evaluate the contribution of training to access credit, and the use of inputs and production of seed (Nov 2011)	
	WCA	3. Farmer organizations strengthened at book keeping, (cash flow, profit and loss account) in Burkina Faso, Mali and Niger (May 2012)	
	WCA	4. Assess the current sources of capital employed by farmer organizations (Dec 2010)	
	WCA	5. Identify financial institutions and evaluate with them options to provide capital to farmers organizations (group lending schemes, small entreprise development loans) (Feb 2011)	
	WCA	6. Facilitate contracts between farmers' associations and financial institutions (May 2011)	
	WCA	7. Linkages established between financial institutions and farmer organizations to access finance for input supply and output marketing in Mali and Niger (May 2011)	
	WCA	8. Strengthen 5 warrantage schemes in project sites (Jan 2011)	
	WCA	9. Evaluate the contribution of warrantage to market efficiency (more grain delivered to market, better quality grain delivered, higher farm gate prices, lower marketing costs and adoption of new technologies) (Jan 2013)	
	WCA	10. Warrantage and credit guarantees strengthened with partners to increase farmer access to input finance for dryland cereals (link with CNFA and AGRA initiatives) in Mali and Niger (Apr 2013)	
	ESA	1. Farmer organizations in Ethiopia, Kenya and Tanzania trained in basic business planning to be able to access finance to support purchase of surplus finger millet and sorghum (Oct 2010)	**December 2010**
	ESA	2. Farmer cooperatives and groups informed about good business practices and the benefits of peer-monitoring and timely payment of loans from financial institutions (December 2010)	**May 2011**
	ESA	3. Capacity of farmer organizations in Ethiopia, Kenya and Tanzania to access finance strengthened (May 2012)	
	ESA	4. Financial institutions lending to farmer associations identified and briefed about business opportunities along the finger millet and sorghum value chains (February 2011)	**May 2011**

	ESA	5. Strategies for encouraging financial institutions to provide loans to farmer groups with promising business plans discussed (including option of using partial credit guarantees) (April 2011)	**May 2011**
	ESA	6. Awareness of financial institutions about business opportunities in sorghum and finger millet value chains in Ethiopia, Kenya and Tanzania enhanced (May 2011)	
	ESA	7. Financhial institutions that have been briefed about business opportunities along the finger millet and sorghum value chains introduced to farmer organizations (October 2011)	
	ESA	8. Linkages established between financial institutions and farmer organizations to access finance for input supply and output marketing in Ethiopia, Kenya and Tanzania (February 2012)	
	ESA	9. Key partners (warehouse operators, banks, etc) in implementing warehouse reciept systems to provide finance to organized farmer groups identified (September 2012)	
	ESA	10. Warehouse receipts, credit guarantees and other schemes promoted to increase farmer access to input finance for dryland cereals in Ethiopia, Kenya and Tanzania (December 2012)	
	ESA	11. Monitor contractual arrangements between farmer unions and traders (May 2011, 2012, 2013)	
	SA (SO)	1. Identification of financial institutions (one per each region) and informing them about the business opportunities along the value chain (April 2010)	
	SA (SO)	2. Development of a flyer on the postrainy season sorghum value chain for the target areas from the existing knowledge and opportunities (July 2010)	
	SA (SO)	3. Financial institutions informed about business opportunities along the value chain (July 2010)	
	SA (SO)	4. Development of training material (one brochure) on good business practices in accessing finance from alternative sources (August 2010)	
	SA (SO)	5. Training of selected 100 farmers (50 women and 50 men) from the farmers associations every year on good business practices in accessing finance from alternative sources (August 2010, 2011and 2012)	
	SA (SO)	6. Farmer organizations in cluster villages strengthened and educated about good business practices in accessing finance from alternative sources (August 2012)	
	SA (SO)	7. Development of a flyer on various market opportunities for postrainy season sorghum seed, grain and stover (January 2010)	
	SA (SO)	8. Training the farmers (100 farmers per each region each year) on various market opportunities for postrainy season sorghum seed, grain and stover (November 2010, 2011 and 2012)	
	SA (SO)	9. Enhancing the access to institutional finance to the seed farmers through provision of warehouse receipts (May 2011, 2012 and 2013)	
	SA (SO)	10. Increased farmer access to input finance for input supply and output marketing for postrainy season sorghum production promoted through warehouse receipts and other schemes (May 2013)	
	SA (PM)	11. Flyer on the pearl millet value chain developed for the target areas, and translated to local languages (November 2009)	**August 2010**
	SA (PM)	12. Financial institutions identified (one per state) and informed of business opportunities along the pearl millet value chain (January 2010)	**August 2010**
	SA (PM)	13. Financial institutions informed about business opportunities along the value chain (January 2010)	**August 2010**
	SA (PM)	14. Brochure (see Milestone 4 above) on good business practices in accessing finance from alternative sources translated into local languages for Gujarat, Haryana and Rajasthan (February 2010)	**August 2010**
	SA (PM)	15. Selected farmers (50 women and 50 men) from farmers' associations trained in good business practices for accessing finance from alternative sources (May 2010, 2011 and 2012)	May 2010 **(August 2010)**
	SA (PM)	16. Farmer organizations in cluster villages strengthened and educated about good business practices in accessing finance from alternative sources (April 2012)	
	SA (PM)	17. A flyer on market opportunities for pearl millet grain and stover developed in local languages (March 2010)	**August 2010**
	SA (PM)	18. Farmers (50 per state per year) trained on various market opportunities for pearl millet grain and stover, including use of market warehouse receipts (May 2010, 2011 and 2012)	May 2010 **(August 2010)**
	SA (PM)	19. Increased farmer access to input finance for input supply and output marketing for pearl millet production promoted through warehouse receipts and other schemes (May 2012)	
Activity 6	**Region**	**Enhance capacity of partners (e.g., NGOs, farmer organizations, private-sector, extension) to deliver appropriate cereal technology options to farmers and increase alternative use of dryland cereals**	
Milestones:	WCA	1. Specific training needs prioritized and appropriate trainer identified (Dec 2009)	
	WCA	2. ICRISAT and NARS scientists and other partners trained in participatory approaches (Dec 2009)	

WCA	3. Partners in technology delivery from each target area meet and exchange experiences (Oct 2010)	
WCA	4. Experiences with integrating delivery of seed, crop management techniques, inputs, and market linkages exchanged among project partners in WCA (Feb 2013)	
WCA	5. One MSc student per country trained in technology change (Mali, Niger, Burkina Faso and Nigeria) by Jan 2012	
ESA	1. Training workshop on participatory research and technology delivery techniques held for collaborating partners from research, extension and seed production and marketing agencies (March 2010)	
ESA	2. Capacity of scientists enhanced to facilitate choice by partners of appropriate technology for widespread adoption in Eritrea, Ethiopia, Kenya, Southern Sudan, Tanzania, and Uganda (September 2010)	
ESA	3. Potential partners for sorghum seed production and distribution identified in Eritrea, Ethiopia and Tanzania (May 2010)	
ESA	4. Gaps and challenges in seed production and distribution systems assessed in Eritrea, Ethiopia and Tanzania (September 2010)	
ESA	5. Sorghum seed producers and distributors in Eritrea, Ethiopia and Tanzania trained on seed policies and internation seed regulations inlcuding biosafety issues to faciliate seed movements and knowledge and also to effectively contribute in seed policy debates (December 2011)	
ESA	6. Sorghum breeders from Eritrea, Ethiopia and Tanzania linked with private seed companies to gain practical experience in various elements in seed increases and purity evaluations (March 2011)	
ESA	7. Extension service personnel from Eritrea, Ethiopia and Tanzania trained to establish and strengthen farmer feedback to breeders and 2 women farmer groups participate in feedback pprovision (May 2012)	
ESA	8. Capacity of sorghum extension staff, seed producers and distributors enhanced in preparation for product deployment of African biofortified sorghum anticipating that regulatory systems will be inplace (May 2012)	
ESA	9. Training materials for enhancing agribusiness, grain marketing and managerial skills prepared and shared with partners (May 2010)	
ESA	10. Training of trainers conducted in Ethiopia, Kenya and Tanzania and trained trainers faciliated to train farmer organizations immediately after being trained (September 2010)	
ESA	11. Training provided to enhance the agribusiness, grain marketing and managerial skills of farmer organizations in Ethiopia, Kenya and Tanzania (September 2011)	
ESA	12. A seed production training material prepared and course held in each country for NARS breeders, and seed company staff (December 2011)	
ESA	13. Training and technical support in finger millet and sorghum seed production for seed companies and seed growers completed in Eritrea, Ethiopia, Kenya, Tanzania and Uganda (March 2011)	
ESA	14. Training of trainers in integrated Striga management held in Eritrea, Ethiopia, Tanzania and Uganda and trained trainers facilitated to train agricultural service providers immediately after being trained (May 2011)	
ESA	15. Training and technical support in integrated Striga management for sorghum provided to agricultural service providers e.g. extension, agro-dealers, and farmer associations in Eritrea, Ethiopia, Tanzania and Uganda (March 2012)	
ESA	16. Training of trainers in integrated blast management held in Ethiopia, Kenya, Tanzania and Uganda and trained trainers facilitated to train agricultural service providers immediately after being trained (May 2010)	**September 2010**
ESA	17. Training and technical support in integrated blast management for finger millet provided to agricultural service providers e.g. extension, agro-dealers, and farmer associations in Ethiopia, Kenya Tanzania and Uganda (September 2011)	
ESA	18. Training of trainers in post-harvest handling held in Eritrea, Ethiopia, Kenya, Tanzania and Uganda and trained trainers facilitated to train women entrepreneurs and organized womens' groups immediately after being trained (March 2012)	
ESA	19. Training provided to farmer groups (especially women) on better post-harvest handling and processing techniques in Eritrea, Ethiopia, Kenya, Tanzania and Uganda (May 2013)	
SA (SO)	1. Developing the training material (one flyer each) on postrainy season sorghum crop management, varieties seed production and village seed systems and grain and stover marketing in the target areas (January 2010)	
SA (SO)	2. Training the farmers groups (6, 50 members in each), women's self help groups (2 in each region, 40 members in each) and KVK field staff (6) in postrainy season sorghum crop management, purity maintenance in seed production and grain and stover marketing in the target areas (September 2010, 2011 and 2012)	
SA (SO)	3. Farmers groups, women's self help groups and KVK field staff trained in postrainy season sorghum crop management, varieties seed production and village seed systems and grain and stover marketing (September 2012)	
SA (SO)	4. Development of training material (one brochure) on seed storage warehouse management and book-keeping in the local language (March 2011)	
SA (SO)	5. Training the selected farmers (15) on seed storage warehouse management and book-keeping (April 2011)	
SA (SO)	6. Training another set of selected farmers (20) on seed storage warehouse management and book-keeping (April 2012)	
SA (SO)	7. Farmers groups trained in seed storage warehouse management and book-keeping (April 2012)	

SA (SO)	8. Development of information, education and communication (IEC) materials in Marathi language on post rainy season sorghum value chain development for grain and stover production and value addition for marketing stover (August 2010)	
SA (SO)	9. Training the project farmers (300 from each region every year) by conducting field days (one per year in each region) and exposure visits (2 per year in each region) and distribution of IEC material (October 2010, 2011 and 2012)	
SA (SO)	10. Field days and exposure visits organized for technology demonstration and dissemination for project farmers material (October 2012)	
SA (PM)	11. Training material (one flyer each) developed in local languages on pearl millet crop management, and grain and stover marketing in the target areas (March 2010)	
SA (PM)	12. Farmers' groups (2 per state, 50 members in each), women's self help groups (2 in each region, 40 members in each) and KVK field staff (6) in pearl millet crop management, and grain and stover marketing in the target areas (May 2010, 2011 and 2012)	
SA (PM)	13. Farmers' groups, women's self-help groups and KVK field staff trained in pearl millet crop management and marketing (May 2012)	
SA (PM)	14. Development of information, education and communication (IEC) materials in Gujarati and Hindi languages on pearl millet value chain for grain and stover production and value addition for marketing stover (June 2010)	
SA (PM)	15. Project farmers trained (300 per state per year) by conducting field days (one per year per state) and exposure visits (2 per year per state), and distribution of IEC material (September 2010, 2011 and 2012)	
SA (PM)	16. Field days and exposure visits organized for technology demonstration and dissemination for project farmers (September 2012)	

Acronyms

AGRA	Alliance for a Green Revolution in Africa
AICPMIP	All India Coordinated Pearl Millet Improvement Project
EAGC	East Africa Grains Council
INRAN	Institut National de Recherche en Agriculture du Niger
KVKs	Krishi Vignan Kendras
MARKETS	Maximizing Agricultural Revenue and Key Enterprises in Targeted Sites
MAU	Marathwada Agricultural University
MHM	Millet Head Miner
MPKV	Mahatma Phule Krishi Vidyapeeth
NARES	National Agricultural Research and Extension Systems
NARS	National Agricultural Research Systems
P4P	Purchase for Progress
QDS	Quality Declared Seed
NRCS	National Research Center for Sorghum
TLII	Tropical Legumes II
WASA	West Africa Seed Alliance
WFP	World Food Program